THE RAILWAY REVIEW

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STEEL SHAFTS.—The fact that steel shafts break from the outside instead of from the inside goes against the microscopical examination of minute bits of the interior of shafts. One steamship engineer who had put in 110 steel shafts in 14 years, one of which had run 1,000,000 miles and was still good, did not take any interest in the microscope. The naval engineers in England who have been going over the whole question think breakage is generally due to fatigue, a correct view because steel has nerves just as much as human beings. Some engineers still favor the boring out of shafts in order to take away that part containing defects in casting; but this is not a general rule because often the best part of the steel is towards the center of the shaft and not on the outside. In cooling of a steel casting the sulphur and carbon collected in the center because that part remained fluid longest. Forgings need annealing just as castings do, but if steel castings were put in an annealing furnace it would be ruined. One eminent engineer declares the proper way to make a steel shaft is with the hydraulic press. The custom of one well known maker of shafts is to anneal a straight forging, turn it in the lathe and then anneal it aga n. They produced the collars at the end by upsetting the metal so as to get the fibers running round into the flange from the shaft. Just what fatigue of metal means in a chemical or mechanical sense is hard to define as every worker in metal knows. Still that is the only word we have to describe a result and condition.—Engineering Mechanics.

FRACTURES IN STEEL.—At a recent meeting of the Sheffield Society of Engineers and Metallurgists, a lecture was delivered by Mr. T. Andrews, F. R. S., M. Inst. C. E., on "Microscopic Internal Flaws Inducing Fracture in Steel". For many years past the lecturer has been engaged upon researches respecting deterioration by fatigue in metals, and he communicated last week some of the results of his investigation. Mr. Andrews is of opinion that if it were possible to produce a perfect metal, theoretically there should be no deterioration by fatigue. During his remarks he dealt with the causes of many of the so-calied mysterious fractures of steel engineering structures, such as steel locomotive and other railway axles, rails, tires, steamships propellor shafts, crank shafts, artillery guns, ship plates bridge girder plates and boiler plates. It was shown by approximate actual micrometer measurements made by Mr. Andrews, that an ordinary railway axle is composed of about 2,313,178,300 primary crystals, the latter often being again subdivided into a still larger number of secondary crystals. He pointed out that many fractures in steel are due to the presence of innumerable internal micro-flaws in the metal, caused by the presence of very minute quantities of sulphur and other impurities. Sulphur was shown to be the most dangerous element in producing these micro-flaws, owing to the formation, during the solidification of large masses of steel, of sulphide of iron, which on the final crystalization of the metal, located itself between the ultimate crystals of the steel. The deleterious influence of other impurities such as phosphorous and silicon was dealt with. Mr. Andrews spoke highly of the standard of education at the Sheffield Technical School, and stated in conclusion, that one of the highest objects of engineers and metallurgists should be to promote the interests of the public safety in the designing and making of engineering structures for railway, marine and other purposes.

CONVERSION OF EMERY INTO CORUNDUM.—An electric process of converting emery into corundum by means of the arc of alternating currents has been patented. As heat and not decomposition is aimed at, continuous currents would be unsuitable. The furnace is made of firebricks and stands on two bridges; the hollow underneath serves as receptacle for the fused mass there being a small hole in the bottom of the furnace. This hole is covered with glass plate. The electrodes (carbon rods) are approached to within one or two inches; the interval is packed with lumps of carbon. The emery, also the finest dust, of little use otherwise, is mixed with powdered coal, the amount depending on the iron oxide in the emery; for 25 per cent of oxide 5 per cent of carbon is reckoned. The coal lumps are soon burned by the oxygn of the iron oxide and the arc forms under hissing. The inner mass begins to melt, the glass plate gives way and a stream of fused corundum flows out. The hard outer crust is then broken with iron rods and the new material thus fed to the arc. This addition stops the flow which starts again after ten or fifteen minutes. The base plate is strewn with fine emery powder to protect it from the intense heat of the fused mass. The resulting corundum is almost free of water, of which the emery consists about 5 per cent. It is crystalline, colorless and then resembling, quartz; pink or blue, fine, small crystals of sapphires have been found in druses. The current is kept at 250 amperes and the pressure is 40 or 60 volts.

THE INFLUENCE OF THE TECHNICAL PRESS IN ENGINEERING PROGRESS.—A not altogether undeserved compliment was recently paid the technical press by Prof A. B. W. Kennedy in the course of his "James Forest" lecture before the English Institute of Civil Engineers. "No one," he said, "who is familiar with the progress in such matters as I have this evening dealt with, during the last twenty years, and has noted the extraordinary development which has taken place, can fail to be struck with it. No doubt a considerable part of this development has been due to the better education generally of engineers, and particularly to the great extension of engineering literature, in which undoubtedly the engineering newspapers have played a most honorable and important part."

HUNTING MARKETS.—The new commercial treaty between Germany and Japan which was ratified by both governments on April 4 is hailed with great satisfaction by the German manufacturers. The last two years have been characterized by a vast increase in the German exports into Japan, and it is believed that under the new treaty the German trade with the Island Empire can be developed to still greater extent, at least in several important articles. The German total export to Japan, which averaged from 1892 to 1894 18,000,000, marks annually, reached the figure of 27,000,000 marks in 1895. The bulk of the tonnage is made up of iron and ironware. The following table shows the quantity of the principal iron articles exported directly from Germany to Japan during the last four years:

	1892 and '93. Metric tons.	1894 and '95 Metric tons
Rails and rail fastenings	1,300	5,434
Bar and angle iron	21,516	37,172
Plates and sheets	635	1,528
Wire	7,364	8,353
Bridge iron	304	1,819
Wire rope	11	121
Springs and axles for railroad cars	191	487
Wire nails	23,968	25,891
Needles	10	12
Fittings for clocks and watches	23	118
Other iron ware	597	460
Locomotives, piece	141	186
Cars, piece	196	206
Cast iron machinery	538	911
Cartridge	3	159
Zinc, raw and rolled	2,290	4,059

Especially notable in these figures is the enormous quantity of wire nails which Germany exports annually to Japan. In fact, Japan is, after Great Britain, Germany's best customer in this line and it still wants more. It is now reported on the best authority that a wealthy Dutch syndicate intends to establish factories of different kinds in Japan in order to take advantage of the cheap labor to be had there, wages in that country ranging from 20 cts. to 25 cts. a day.

USING EMERY WHEELS.—The emery wheel is one of those improvements that have come to stay in the majority of shops, but says J. H. Allen in Dixie, like fire and electricity, its use demands carefulness and intelligence. It is possible to grind almost any tool upon an emery wheel and not injure its temper, and it is also possible to ruin it in a very small fraction of a minute. I know of a shop where all of the lathe tools are ground upon an emery wheel, and ground by the men themselves, and where, after each grinding, an air line is taken to the blacksmith shop to have the tool retempered because the grinder knows that he has ruined it, and yet no attempt has ever been made to teach them better manners. I once suggested to the superintendent that it was a good idea to have all the tools ground by one man, but was told that their shop was so small that it would not pay to introduce such a system. I said nothing more but made a little calculation. There were ten men in the shop and allowing that each one sharpened and had his tool tempered on an average of three times a day, with an average consumption of 10 minutes for each trip, including the brief conversation that takes place at the forge, we find five hours consumed each day by the men, and five by the blacksmith, which amounts to just one day if it were put into one man's time. And if one man cannot dress, grind and deliver the tools for ten lathe hands, and keep everything up in first-class shape besides finding time for other occasional odd jobs, well—it would seem advisable to look abroad and search for a man who can, and you may rest assured that you need not spend much time in finding him. So when it comes to reckoning the time wasted as the result of careless grinding, a tool dresser and grinder may be found to be a profitable investment.

THE LAVAL STEAM TURBINE.—At the meeting of the Societe Internationale des Electriciens on the 8th inst., M. Fayot read a paper on the latest results obtained from the trials of the Laval steam turbine. A 50 horse power turbine was tested at a steam pressure of 5 kilogrammes per square centimeter (71 lb. per square inch) and gave a consumption of 10.58 kilogrammes of steam per horse power hour. Two other trials, made at the Bordeaux Exhibition at full load (100 horse power) for seven hours at a boiler pressure of 8 kilogrammes (113 lb. per square inch) and a vacuum of 66 centimeters in the condenser, resulted in a consumption of 9.16 kilogrammes of steam per horse power hour. With a load of 50 horse power there was a consumption of 10.8 kilogrammes of steam. A third trial after nine months' use resulted in a consumption of 8.9 kilogrammes per horse power hour on a 10 hour trial. A fourth test at Troyes on a 20 horse power turbine driving shafting which drove four dynamos gave a consumption of 8.9 kilogrammes of steam, the pressure being 5 kilogrammes (71 lb. per square inch.) In a fifth trial made with a 77 horse power turbine at the Magasins de la Place Clichy, with a steam pressure of 12 kilogrammes (170 lb. per square inch) and a 65 centimeter vacuum in the condenser, the consumption was 10.5 kilogrammes per horse power hour. M. Fayot then touched the question of the variation of the steam consumption with the output and the number of nozzles. M. Hillairet asked what the consumption was on starting. M. Fayot replied that it was 30 to 35 per cent. more than the normal amount. M. Arnoux observed that it was quite possible to show why the efficiency was greater with larger turbines; it was due to the fact that the speed of the vanes was greater with large turbines; in turbines of 200 horse power this speed was 400 meters per second, whilst in 75 horse power turbines it was only 60 meters per second.

SHOP FLOORS.—The shop floor is a sort of a perennial subject that comes up at all sorts of regular and irregular intervals, and may be considered as always alive. I was struck once by the difference in the apparent activity of two sets of men working on similar jobs at the vise in two rooms of a large shop. One was in an old building and the other in one of recent construction. In the former the men stood easily and naturally at their work, and showed no symptoms of a hankering for a seat on the bench, while in the latter, the men were shifting their weight from one foot to the other, throwing one leg upon the bench at every opportunity, and showing every evidence of foot fatigue. It was noticed by the superintendent and occurred to him that it was due to the floors upon which the two gangs of men were standing. In the old shop the floor was of wood, springy to a certain extent, and a poor conductor of heat. In the new shop it was of the most beautiful concrete, an excellent conductor of heat from the feet of the workmen, and as unyielding as the granite rock in the neighboring hills, so the benches in the new shop were raised a couple of inches, and each man was given a platform of wood that rested on two cross pieces at the end, and which was slightly springy. The foot weariness disappeared almost at once, and no further trouble was ever experienced. Which goes to show that the most comely floor to look upon is not always the best for the workmen.—J. H. Allen in Dixie.

COST OF RAILROAD CONSTRUCTION IN JAPAN.—The cost of construction per mile of line in Japan, according to the report for the year ending March, 1894, varied considerably, according to the circumstances under which it was carried out. That of the Tokio-Yokohama section of 18 miles was 162,741 yen per mile; but this being the first railway undertaken in the country was necessarily expensive as it was superintended by foreign engineers and carried out to a considerable extent by foreign labor. The same was true, although to a less degree, of the Koke Otsa section, which was begun in November, 1870, and completed in September, 1879, and of which the cost per mile was 142,659 yen—or dollar. Probably the Yokohama Oguki section, which was begun August, 1885, and completed April, 1889, may be taken as representing the best average conditions. Its length is 258 miles, and its average cost per mile was 52,156 yen. As indicating the great reduction in the cost of construction, the report shows that before the nineteenth fiscal year the amount of fixed capital per mile of line open in the government railways was 104,697 yen, whereas in the twenty-sixth year it was only 64,671 yen. The decrease arose not only from the cheaper method of construction adopted, but also from the fact that the services of foreigners were almost entirely dispensed with, and native material and manufacturers employed as much as possible. The proportion of working expenses to the revenue is 36 per cent, and when compared with that of the previous year shows a decrease of 11 per cent, obtained from a large increase in the earnings and decrease in the expenses incurred in operation, especially in the locomotive expenses and the low price of coal which prevailed during the year.

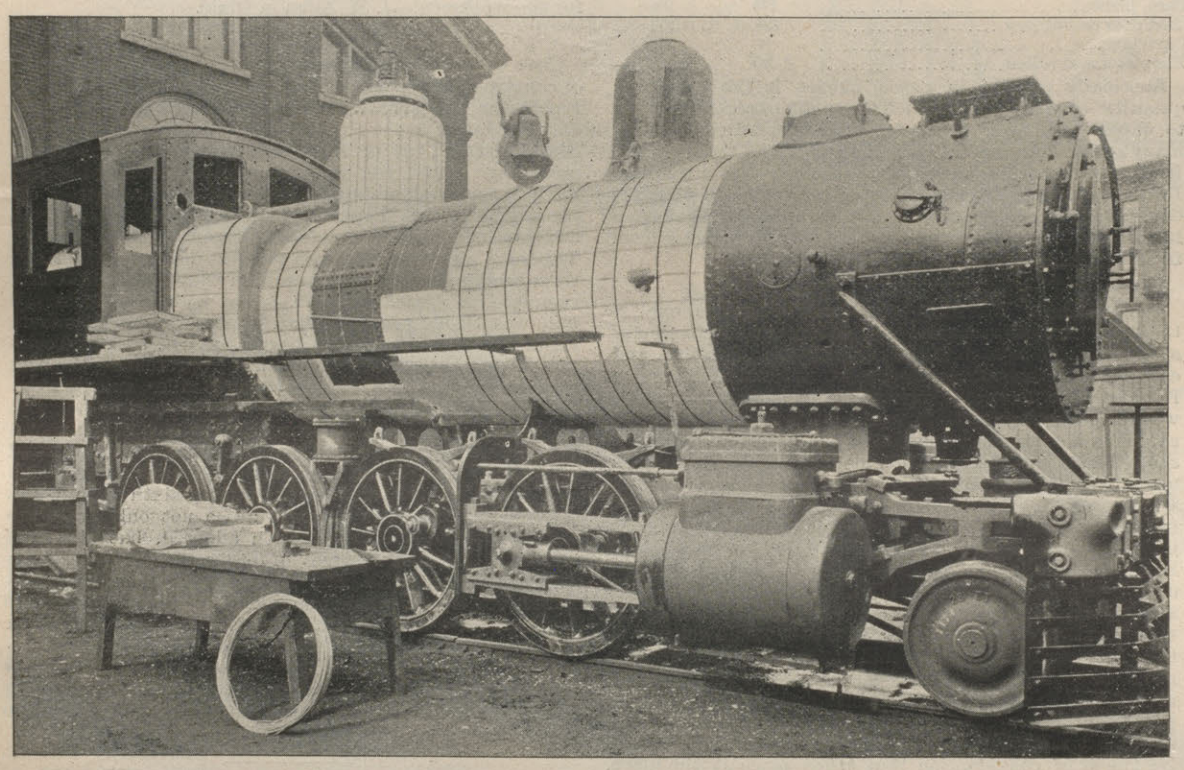
A PECULIAR FEED PUMP ACCIDENT.—It is stated in the Engineers' Gazette, of London, that during a passage across the Atlantic the feed pumps suddenly refused their duty, and in spite of every effort, the feed water persisted in coming out of the overflow pipe instead of passing through the checkvalves. The pumps were examined and found all right. The checkvalves were well tapped with a spanner and nothing was apparently wrong. As the temperature of the feed water was much higher than usual, it was considered that the slide valves must be out of order. The state of the weather, however, was such that it was out of the question to think of lifting the covers, and there was neither compound gage nor indicator to show what was going on internally. Here was a dilemma. The loss of fresh water could not be allowed to continue, and the engines could not be stopped long enough to find out the fault. A large cask was, therefore, lashed in a corner and the overflow pipe turned so as to discharge into it. With the aid of gaspipe, odd pieces of lead piping, and whatever else would serve the purpose, a suction pipe was constructed and connected in a rough and ready fashion to the donkey pump, and by this means the boilers were fed. This continued for two days. Then the weather moderated and arrangements were being made to lift up the valve chest covers, when all at once the overflowing ceased, the feed pumps commenced to work beautifully, and the passage was finished without a hitch. It was with considerable interest that the engines were examined as soon as possible. It was found that the high pressure slide valve was worn ⅛ inch into the port face, and being slack sideways, a vertical ridge of ⅛ inch was left on either hand. During the heavy weather the valve had got on to the ridge on one side, and the constant list of the vessel caused by the gale had kept it there. There was consequently a clear passage leading to the low pressure casing. High pressure steam passing through the low pressure cylinder caused the feed water to become too hot, and the vapor in the pumps prevented them from working. When the vessel righted the valve dropped

back into its place and everything went on as before. It may appear strange to those who have always been in well equipped steamers, that a large set of compound engines should be fitted minus such necessities as compound gages, but such was the spirit of economy in some companies that it was by no means an infrequent occurrence. The holes for the indicator pipes had not even bored.

MAGNESIA SECTIONAL LOCOMOTIVE LAGGING.

Attention has frequently been called through the columns of this journal to the importance of making a careful selection of material for protecting steam boilers from radiation. This is specially important with locomotive boilers which more than any others are subject to radiation on account of their exposed condition while running upon the road. That there are material differences in the heat insulating properties of different covering preparations will be seen from the table of results of the tests made by the Boston Manufacturers Mutual Fire Insurance Company which were presented in the RAILWAY REVIEW of March 21, 1896, together with a description of the experiments and the apparatus employed. These results were favorable to magnesia covering and in the accompanying illustration the manner of applying this material to locomotive boilers is clearly shown.

The lagging is furnished by the Keasby & Mattison Company of Ambler, Pa., in sections of a convenient size for ready handling and these sections are fitted to the boiler and held in place by steel bands as shown in the illustration. The material is



MAGNESIA SECTIONAL LOCOMOTIVE LAGGING.

easily cut by means of an ordinary saw for fitting around corners. The sections are put on one at a time and clamped firmly in place and then gone over with a stiff brush which leaves it in good condition for the application of the planished iron jacket. This lagging has the advantage in addition to being a good insulator of being easily applied and it can also be taken off and replaced a number of times without injuring it. The illustration shows one of the engines on the Pennsylvania Railroad and it is stated that on this road alone there are some 250 engines now equipped with it. Many large roads are reported to be now putting it on their engines and find that its application not only reduces the coal consumption, but also enables the engines to haul heavier trains and make better time.

THE RAILROAD STATION AGENT.

At the national convention of station agents held in Chicago during the past week, Mr. E P. Ripley made an address in which some valuable advice was given, as will be seen by the subjoined portion of his remarks:

You are a spoke in the wheel of the transportation chariot—and by no means an inferior or secondary spoke. You assemble at stated intervals, like fifteen or twenty other spokes, to discuss the symmetry and general condition of the wheel, and especially of that particular portion of it to which you are most closely joined. You have, I believe, gained much from these discussions, as all men do when they rub their wits against those of others. I am a hearty believer in these associations, and I am glad to see them prosper and interest in them kept up.

Looking over your list of subjects I see chestnuts—things that have bothered the heads of agents, lo, these many years; but looking back upon the past 20 years I realize that this organization and kindred organizations have settled some of those questions, and that in time they will settle the others. We see many things that need reforming. and sometimes when things go wrong it seems to us as if our business had more thorns in it than any other; but those of us who have grown gray in the service can tell you that in many respects the methods of today are vast improvements over those of 20 or even 10 years ago.

I remember well that shortly after assuming my duties as a general freight agent I was scandalized at the looseness prevailing in the matter of weighing car-lot freight. As a matter of fact many roads published rates per car, regardless of weight, and those whose rates were nominally in cents per 100 pounds rarely weighed the cars. We had a long, hard struggle to reform this, and it was not wholly regulated for many years; but we finally started the Western Weighing Association, and I am afraid you would not credit me if I should tell you what I believe that organization has saved to the railroads. I remember well, also, the origin of the Inspection Bureau, and how timorous some of the roads were as to joining it. When a well known jewelry firm shipped an alleged case of "hardware" or "nuts and bolts," the agent was expected to bill it accordingly and ask no questions, and if that box was lost and the shipper presented a bill for silver-plated ware, we were expected to pay it. The shippers had become bold by long immunity, and even those who wanted to be honest were driven to misrepresentation by the practices of their dishonest competitors.

One day a party of six or seven railroad men were traveling from St. Louis to Chicago, and this method of swindling was under discussion. Some one suggested an inspector; others denied that we had a right to open boxes presented for shipment, but at last the subject was turned over to a committee, and the result was the Inspection Bureau. You all know how it works and what it has done—and right here I want to say what is well known to all of you who are stationed in the west—that we have been exceedingly fortunate in the administration of these two bureaus under George L. Carman. Their efficiency and economy are largely due to his indefatigable and intelligent efforts, and I know of no man who has done more to systematize that part of railway operations coming under his jurisdiction, or who has the means of saving the railway interests larger sums of money.

Of the car service associations so much cannot be said; not because they have not been, in general, well handled, but because they have not as yet been supported by the railroads themselves as they should be, and also because the methods have not yet been boiled down to exactness. The system is young and has some of the rawness and inexperience of youth still clinging to it. I see that you discuss to-day the question whether car service should be collected by the agent or by the association. I shall not project myself into that discussion; the main thing is to collect it and keep it.

No doubt you all recall other matters in which the practices of former years have been greatly improved on, and no doubt each and every one of you has a scheme for one or more other reforms which he intends to spring on this convention. Let me tell you this: that if your plan has merit it will be adopted. Perhaps not this year—possibly not next year—but some day, because the world does move and the slowest of us move with it. If you have a good scheme and you are sure of it, don't wait for unanimous action; try it with as many others as you can get to join you; if need be, try it alone. Not one of all the reforms I can recall, and which are now universal began unanimously. There are always doubters, men who tear down, but who never build up—who see the objections to any plan and who never experiment, but wait till others have demonstrated the value of the proposition. If you wait for them to come you will never get anywhere.

I have compared you to spokes in a wheel. Now a spoke, to be useful, must be neither too long nor too short, but must fit exactly, if it is to perform its proper function. I have seen and dealt with in my time, many local agents—some of them have been too long, others much too short. I am familiar with the man who knows it all, as well as the man who lays down on the general office every time he encounters anything out of the every-day routine; but in all sincerity and with no attempt at flattery I will repeat here what I have often said in a less public way—that the local agent in one of our large cities has a position not only exceedingly important to the interests of his company but which it requires a high order of ability to fill. A man who can satisfy, even approximately, the shipping public and the general office, and who can deal in the same day with the freight handlers and the merchants, must possess an amount of tact and a faculty of adaptation which are given to few men. There is a large portion of the community who judge of railroad policy and railroad methods by their own intercourse with railroad men, and it follows that you have it very largely in your power, not only to personally make friends or enemies for the particular corporation you represent, but for the railroads as a whole. Especially in the smaller towns of the union the agent, if he be a student and well posted upon general railroad subjects, can largely influence public opinion. There is probably no subject of equal importance concerning which the generality of citizens are so profoundly ignorant, as they are concerning railroad matters. The business is one which seems to possess a peculiar fascination for the imaginative reporter, the honest but fanatical reformer and the political harlequin. No stories are too preposterous to be written or stated as facts. I have always believed and said that much of the abominable legislation of the past 20 years arose from the apparent apathy of the railroads as to the manufacture of public sentiment. We hear speeches and we read books containing the most outrageous untruths, but they are rarely contradicted, mainly, no doubt, because we are all busy men and have other things to do, but each and every one of you can help to counteract this. You need not, of necessity, make speeches or write for the papers—though that would be well—but you can post yourselves so that in private conversation you can correct the astounding errors into which so many people fall. The attorneys, general managers and presidents can occasionally speak or write, but they, too, are busy men, and reach but a limited audience. The time has come when it is the duty of all classes of railroad men—and none more than the local agents—to take a lively interest in the general welfare and to defend publicly or privately so far as his conscience permits, the interests he represents; and while the railroads should be kept wholly out of politics, the time may come—perhaps has already come in some localities—when it will be the duty of every railroad employe, for the protection of himself, no less than his employer, to use his vote and his influence against the demagogues who both persecute and blackmail the interest that employs us.

SALL MOUNTAIN ASBESTOS.

Sall mountain asbestos gets its name from the fact that it comes from the Sall mountain mine which is located at Santee White county, Georgia. The process of mining consists merely of blasting the material and wheeling it out in wheelbarrows. The rock as it is found is practically pure short fiber asbestos and the only treatment it requires is that of crushing and defiberizing. The quantity contained in the mountain appears to be inexhaustible and this together with the low cost of mining it has made it possible to put it on the market at a cost so low as to allow its use where in former years the price was prohibitive. In fact the price has been so high that it is usually found in use only in small quantities and when a noncombustible was a necessity. The advent of the Sall mountain product has changed this condition and we now find this material being introduced in large quantities as an insulating and deadening material. It is claimed for it that for these purposes it has many advantages over all other materials as it is a clean wholesome material which never looses its original character from disintegration or the effect of fire, water or change of temperature or other conditions. It does not settle and become compact of its own weight and constant jarring has the effect of keeping it light and free.

This asbestos seems admirably well adapted for use as a boiler covering for several reasons, one of the most important of which is the low cost of not only the material itself but also the labor in applying it. For this purpose a stiff motor is made consisting of one portion of saw dust, two portions of asbestos and two portions of slacked lime. To every barrel of his half a pail of old rope is added cut into length of about ¾ of an inch. The latter serves as a bond to the coating and keeps it in place. Three coats of this mixture are applied, each being about ½ an inch thick and about 3½ barrels are necessary for each coat in

covering an ordinary locomotive boiler. After the first coat is applied it is wrapped with with No. 21 iron wire 6 or 7 in. apart and drawn as tight as possible without cutting into the material. If the boiler has been painted it is given a coating of whitewash before the first coat is applied. While the first coat is being put on the boiler is kept at a temperature about equal to blood heat and as dry as possible and for the second and third coats this temperature is increased. The coating soon becomes almost as hard as stone, but it can on being removed be used over again by the addition of a small amount of lime and water. In making repairs a section of the covering can be removed and replaced, the same material being used by adding a small amount of lime and water. The preparation does not corrode the metal of the boiler and a leak can at once be located by the discoloration of the lagging at the defective point.

This lagging is now being used on the engines of the Chicago & Eastern Illinois Railway and also on the Chicago & Northwestern. On the latter road it is being applied to all engines going through the West Chicago Shops, and it is being introduced at all outside shops. The cost of covering an engine having a boiler with a 52 in. shell is only $12.50, and for boilers having from 56 to 62 in. shell $16.50. The amount of asbestos required for each boiler is only about 500 lbs.

This material is also highly recommended as an insulater and deadener for car floors, as it will not settle down and become solid as some other materials which are used for that purpose. The sales agents are Bruner Sprague & Co., No. 1027 Manhattan building, Chicago, who will be pleased to give further information regarding the material.

ROGERS' SIX WHEEL SWITCHING LOCOMOTIVE FOR THE WESTERN RAILWAY OF ALABAMA.

The accompanying illustration was prepared from a photograph received from the Rogers Locomotive Works of Paterson, N. J., which was built by this concern for the Western Railway of Alabama. The engine has a straight boiler of the radial stay type and is 56 in. in diameter at the first course which with a total heating surface of 1344 sq. ft. should give the locomotive ample steaming capacity. The grate area is 14.15 sq. ft and the fire-box is arranged for burning bituminous coal. The total weight of the engine is 98,000 lbs. all of which is on the drivers. The tender has a wooden frame and water capacity of 2,500 gallons and the coal capacity of three tons. The tank slopes to the rear and is carried upon diamond trucks with chilled cast iron wheels with 4¼ x 8 in. journals. The engine is fitted with the Westinghouse driver and tender brake, with the Leach automatic sander. It will be seen that this engine is a remarkably heavy one for yard work and it is an illustration of the tendency toward large steaming capacity for locomotives for switching service. The follo wing table gives the chie dimensions of the locomotive in convenient form.

Gage	4 ft. 9 in
Fuel	Bituminous Coal
Weight on drivers	98,000 lbs
Weight total	98,000 lbs
Wheel base, total, engine	10 ft. 6 in
Wheel base driving	10 ft. 6 in
Wheel base total, engine and tender	36 ft
Hight center of boiler above rails	6 ft. 10½ in
Hight of stack above rails	13 ft. 9¼ in
Heating surface, fire-box	98.64 sq. ft
Heating surface, tubes	1245.43 sq. ft
Heating surface total	1344.07 sq. ft
Grate area	14.15 sq. ft
Drivers, diameters	51 in
Journals, driving axle	7½ x 9 in
Axles, driving material	Hammered iron
Cylinders diameter	18 in
Piston stroke	24 in
Piston rod, diameter	3¼ in
Kinds of piston rod packing	Jerome
Main rod, length center to center	5 ft. 7¾ in
Steam ports length	17 in
Steam ports width	1⅜ in
Bridge width	1⅜ in
Exhaust ports width	2¾ in
Exhaust pipe	Single high
Valves	Richardson's balanced
Valves greatest travel	5½ in
Valves outside lap	¾ in
Valves, lead in full gear	1-16 in
Boiler type of	Straight top
Boiler, working system pressure	165 lbs
Boiler, thickness of material in barrel at first course	½ in
Boiler, diameter of barrel outside of first course	56 in
Seams, kind of horizontal	Sextuple riveted butt joint
Seams, kind of circumferential	Double riveted lap
Crown sheet stayed with	Radial stays
Dome, diameter	27¼ in
Tubes, number	173
Tubes outside diameter	2 in
Tubes length over sheets	13 ft. 9 in
Fire-box length	5 ft
Fire-box, width	2 ft 10 in
Fire-box depth, front	71¾ in
Fire-box depth, back	70¾ in
Fire-box thickness of sheet sides and back 5-16 in crown	⅜ in
Fire-box	brick arch
Grate, kind of	Cast iron rocking finger bars with drop plate in front
Tank capacity	2500 gal
Coal capacity	tons
Frame	Wooden
Wheels kind of	Cast iron, double plate, chilled thread
Trucks, type of	"Diamond"
Wheels diameter	33 in
Axle material	Hammered iron
Journals size	4¼ in. x 8 in

SIX-WHEEL SWITCHING LOCOMOTIVE—ROGERS LOCOMOTIVE WORKS.

THE MASTER CAR BUILDERS' CONVENTION.

The thirtieth annual convention of the Master Car Builders' Association was called to order by Mr. John S. Lentz, the president, at nine, a. m., June 17, at Congress Hall, Saratoga, N. Y. The session was opened with prayer by Rev. Jos. Carey, pastor of Bethesda Episcopal church, of Saratoga, after which an address was delivered by Col. H. S. Haines, in which the large influence of car designers and builders over the social and other forms of development of this country, were referred to. Great credit was given them for producing in the transition from the earliest forms of passenger coaches, which were merely stage coaches adapted to rails, and after that cabooses, into coaches which provide accommodations for every traveler, the like of which princes never have enjoyed in their dwelling places. The various stages in the transition were enumerated and in all the work of improvement the provision of safety was not behind that of comfort. Reference was made specially to the development of automatic brakes, to stronger construction of car framing, and in the development along these lines, artistic finish and good taste in furnishing and decorating had not been neglected.

The present freight car was a triumph of the skill of car builders, as no other structure is subjected to the severe conditions under which cars are continually placed in service. The speaker laid special tress upon the importance in future work of giving to the matter of reducing the ratio of dead to paying load to the lowest possible figure. This with the necessary improvements in lighting and ventilating of passenger cars constituted the only lines upon which much improvement might be expected. The attainment of higher speed was not dependent so much upon the locomotive as upon the reduction in the weight of trains; and the construction of a six car train of not less capacity and convenience than the present cars, and which should weigh no more than five of the present cars, was a line of development to be followed out. The use of the four wheel truck was given a high place in influencing social conditions in this country, in that it made communication between cars possible and tended to break down the caste differences of earlier days which had been perpetuated in those countries where the separate compartment continued in use. The trucks had influenced the construction of the cars, whereas where they are not used the present styles were merely a development of the stage coach. The adoption of a standard axle was commended and similar treatment of the design of body bolster recommended. The technical associations had been criticized as having tended to muzzle invention, but the speaker thought that the contrary was true, and that such associations as this had served to assist and aid inventors by directing their efforts along such lines as would result in fostering useful and needful invention. It had tended to promote uniformity which alone made it possible to interchange rolling stock and this was one of the chief values of the Master Car Builders' Association. In the promotion of a standard type of coupler much energy and much trouble had been avoided. Such work had made possible the application of safety appliances to over a million cars which could not be accomplished without such assistance. A tribute was paid to the individuals who had been responsible for the improvements in car building among which the highest place was given to the introduction of sleeping accommodations upon railway cars.

In his presidential address, Mr. Lentz referred to the fact that during the year from April 20, 1895, to April 20, 1896, there were about 100 per cent more cars built than between the corresponding dates in 1894 and 1895. He briefly recounted the work and influence of the officers of the association in assisting in securing an extension of the time specified in the law requiring the application of hand holds and outlined the progress of the revision of the rules of interchange. In connection with recommendations with regard to the work of the convention, he suggested that the value of the noon hour topical discussions could be greatly increased by a greater amount of attention to this part of the convention by all of the members. He desired to see this become more of a feature of the conventions than it had been. The neglect of a number of manufacturers to arrange new trade catalogs upon the standard sizes adopted by the association was mentioned, and the adopting of these sizes urged strongly to prevent the catalogs from being destroyed at once upon receipt. He also suggested that the technical journals adopt them, or if the present sizes did not serve this purpose, that application should be made for an increase in the

number of sizes with this end in view. The 80,000 lb. capacity car was thought to be the car of the future, in spite of the fact that in discussions held upon this subject it had not been considered necessary at this time. A suggestion was made that on account of the expense of the decisions of the arbitration cases, the roads applying for decisions should accompany the application with a fee of ten dollars to to be paid into the association treasury. Action was recommended upon the solution of the present difficulties which are due to the absence of standards in the loading of car swith logs, lumber and other structural material, and for the disposition of the questions arising from the dripping of brine from refrigerator cars. Mr. Lentz proposed appointing a committee of three members of the association to confer with two representatives of the refrigerator lines to report upon methods to cure the trouble. The desirability of action by the association with regard to the question before congress concerning the completion of the government tests under the supervision of the forestry division was mentioned, and after fitting remarks in regard to the death of Mr. Samuel Irvin, the address closed with congratulations to the railway clubs for their activities during the past year.

After the roll call and the reading of the minutes, the report of the secretary was received, which showed a total membership of 388 as against a total of 372 of last year, and an increase of 57,334 in the number of cars represented. The treasurer's report showed a balance of $5,509.91 in the treasury with all bills paid and no outstanding accounts. The auditing and nominating committees were appointed and Mr. F. W. Lane was elected to associate membership. Mr. R. H. Soule offered a resolution providing for a plan of registering the attendance of members by means of cards to take the place of the old method of calling the roll. Upon motion of Mr. Leeds the subject of "Recommended Practice in the Form of Rules for Loading Lumber and Structural Material" was referred to a committee for report at a later session of this convention. The committee was appointed as follows: Messrs. Leeds, Bush, W. H. Lewis, Day, Stark, Haskell and Coller. At the suggestion of Mr. Walter G. Berg, principal assistant engineer of the Lehigh Valley Railroad, expressed in a communication, resolutions were passed requesting congress to take favorable action with regard to the completion of the timber tests which have been begun, and to publish the record thereof. Messrs. Rearden and Player were appointed a committee to draft suitable resolutions in regard to the death of Mr. Samuel Irvin.

At 12 o'clock the noon hour discussions were taken up, the first subject being, "Tests for air brake hose. Is it possible to approximate a service test in a short time and get an idea of the relative durability and value of different makes?" The discussion was opened by Mr. J. N. Barr, who first described the method of making mechanical tests of samples of hose upon a machine which subjected the them to distortion which closely resembled kinking, and included alternate bending in different directions one end of the sample being fixed in a clamp, while the other was worked by a cross-head. Hose by different makers was found to vary from 200 to 2,800 hours under this treatment before giving out, owing to the differences in the capacity of different materials to withstand the mechanical motion. The experience of Mr. Barr had led him to the conclusion that the idea of expecting satisfactory service from hose which was made with special reference to withstanding high pressures was wrong, and that much value was lost due to the stiffness of hose which was a necessary accompaniment of high pressure resisting qualities. He preferred a hose which was pliable and considered a pressure test of 300 lbs. per square inch as entirely satisfactory, being from four to five times the pressure of service conditions. A pliable hose was necessary, and it must be less strong. The failures were found chiefly at the nipples or the points near the permanent fastenings. Few failures, only about one to four were at kinks in the loop of the hose. The 1-inch hose had also given better results from mechanical tests than the larger size. Mr. Schroyer confirmed Mr. Barr's statements, and believed that durability had to a large extent been lost sight of in efforts to get high strength. The quality of the rubber had been neglected in considering high pressure specifications.

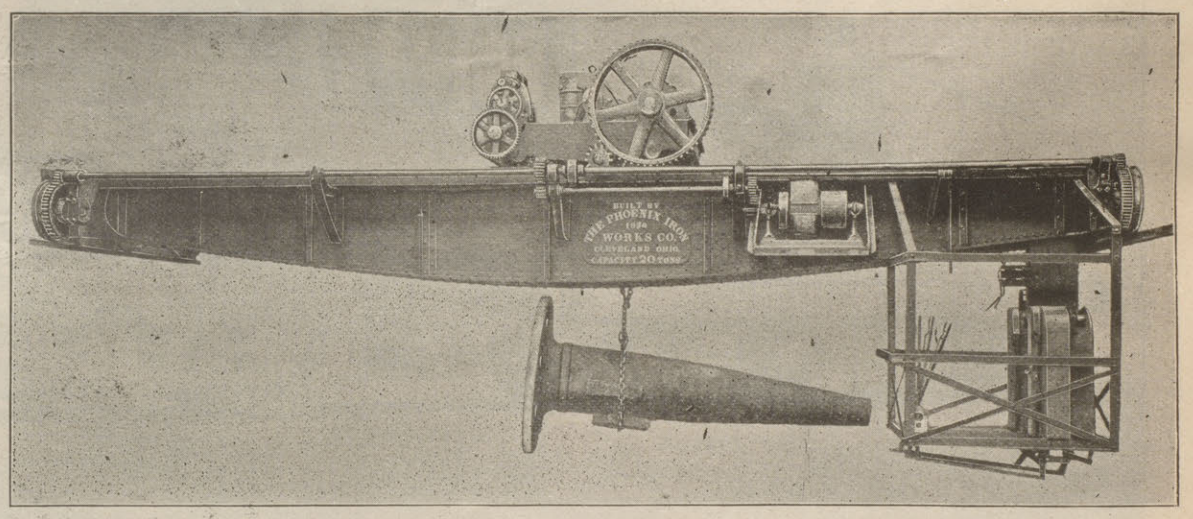
The second question, "What are the comparative advantages and disadvantages in pressed steel and diamond types of trucks," was introduced by Mr. S. Higgins, who thought that the fact that 90,000 pressed steel trucks were now used under freight and coal cars, rendered the subject a highly important one. Some of the advantages of pressed steel construction were a decrease in the number of the parts used in truck construction, a decrease in the proportion of dead to paying load due to lightening the weight of trucks, less liability of getting out of square on account of superior bracing, and this gave less trouble with hot boxes and badly worn journals, better riding of the cars and better protection to the parts of the trucks on account of more favorable locations of the springs. The possible saving of weight by use of pressed steel was about 2,000 lbs. per car over diamond trucks, if the latter were made heavy enough to give the necessary strength. The question of cost of repairs was thought to be favorable to pressed steel, and an argument to bring out the easy riding qualities was that the trainmen selected cars with pressed steel trucks upon which to ride, in preference to those having the usual form of trucks. The arguments advanced in favor of the diamond type were ease of inspection of the wheels and the facility of changing wheels. The pressed steel type was likely to come through wrecks in better condition and was more likely to be in order to admit of hauling wrecked cars into the shops upon their own wheels. The pressed steel truck was past the experimental stage and was likely to be the truck of the future. It also made it possible to adopt a standard form or design. Mr. Sanderson did not consider it fair to compare new pressed steel trucks with old or weak diamond patterns, and believed it possible to design a diamond truck of sufficient strength, which shall be lighter than the other form. He had designed one which was lighter than one form of pressed steel trucks with which it was compared. Mr. Rhodes thought that sufficient attention had not been given to decreasing the weights, and while in some designs a small number of parts had been attained, this feature also had not received the attention which it merited.

The next topic was "Breaks-in-two in trains between cars equipped with M. C. B. type of coupler. To what extent do they occur? What are their causes and how can they be prevented?" Mr. A. M. Waitt found from carefully compiled records that this form of trouble had increased with the use of automatic couplers. In the first five months of 1896 there had been 467 cases of such accidents upon the Lake Shore road and in the yards. Of these 45 per cent was between cars coupled with the link-and-pin, 26 per cent was due to the opening of knuckles of automatic couplers, 21 per cent from draw-bars pulling out and broken spindles or keys, the rest being from a variety of causes. The cause for the opening of knuckles was bad adjustment of the uncoupling appliances, short chains and insufficient allowance of slack in them. A slack of 2½ to 3 in. was sufficient to prevent this trouble. Other members showed that the vertical locking pin frequently jumped or crept upward releasing the knuckle, and the conclusion reached was indicated by the decision to make this the subject of a committee report for next year with a view of suggesting methods of preventing the occurrence of these accidents.

The fourth topic was brought up by Mr. H. A. Bowen, and was entitled "Protective Paint for Metal Trucks." After a brief statement with regard to the protective properties of linseed oil alone and filled with lamp black or its equivalent, and with a list of the requirements of a satisfactory paint, the speaker recommended a coat of linseed oil, upon which, after it was dry, a coat of graphite should be laid. The morning session closed at this point, and in the afternoon the first subject taken up was the report of the committee on the supervision of standards and recommended practice. This report, as amended, consisted of a number of changes in the text and drawings which affected, as a rule, only the smaller details, to bring them up to date. The most radical change recommended was the revision of the standard pedestal and journal box, which was referred to the committee for revision to accommodate the 4¼ x 8 in. journal. It was also ordered that the committee submit a report upon a standard hight of freight-car step based upon the distance above the rail level. These questions are all to be submitted to letter ballot. The report of the committee on laboratory tests of brake shoes, was received, and the discussion deferred until the Friday session. The committee on automatic couplers made no report. The report of the committee on mounting wheels was read by Mr. Barr, and was briefly discussed, with particular reference to standard check gages which were submitted by the committee. The report was ordered submitted to letter ballot, and the last report of the session, "Metal Underframes for Freight Cars" was read by the chairman of the committee, Mr. Sanderson, and the discussion was deferred until Friday, whereupon the session adjourned.

TWENTY TON ELECTRIC TRAVELING CRANE.

The use of electric traveling cranes has become so universal that no shop in which weights of even moderate dimensions are handled is considered complete or even moderately well equipped without such a crane. This however is only a natural result of the great perfection to which the designs have been carried, this being one of the lines in which wonderful progress has been made during recent years. At the present time it is common to lift and carry heavy loads at speeds which only a few years ago were considered impossible. The old style rope drive for all kinds of hoisting machines is to-day considered so slow and liable to break down as to be out of the race and we find many such machines being rebuilt and electric motors applied. In fact there is probably no other line of work in which electricity can be used to better advantage and with greater economy. A test was recently made of a rope drive traveling crane which has been in daily use in a large railroad shop for a number of years past and it was found that 15 horse power was required for driving the rope alone without any load, and this was only a small jib crane capable of handling nothing heavier than a locomotive frame, pair of cylinders or drivers. This crane is to have electric motors applied and the result, will be a saving of about 15 horse power which has been regularly consumed without useful results, for many years.



TWENTY-TON ELECTRIC TRAVELING CRANE.

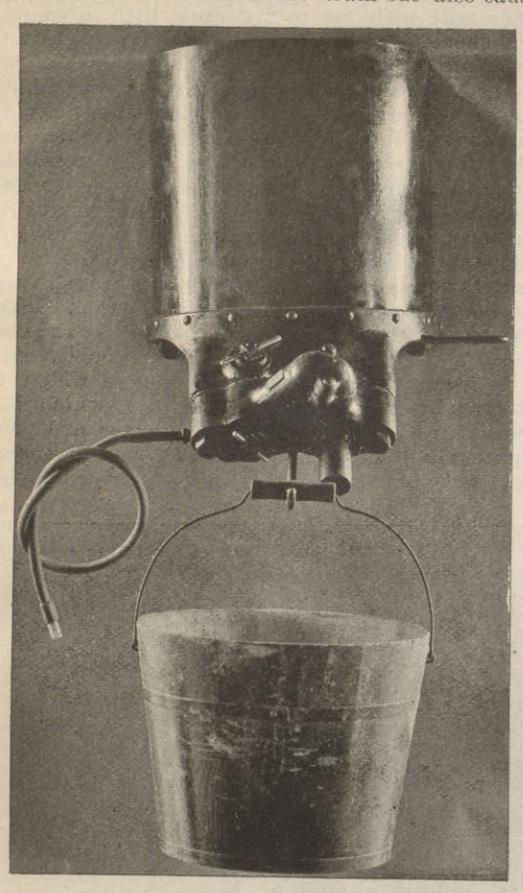
This rapid increase in the use of electricity in this special line has resulted in the introduction of numbers of designs of cranes and in the accompanying illustration will be found a reproduction from a photograph of one which has given exceedingly satisfactory results. This crane was built by the Phoenix Iron Works Co. of Cleveland, O., and is in use in the large pipe foundry of J. B. Clow & Son in New Comerstown, Ohio where five others have been installed by the same company, The crane has three motors furnished by the Janney Electric Motor Company of Indianapolis the same company furnishing the controllers. The span of the crane is 35 ft. and it is stated that this as well as all the others are giving excellent satisfaction.

The Boston Journal of Commerce estimates that there are 109,000 locomotives at present running on the earth. Europe has 63,000, America 40,000, Asia 3,300, Australia 2,000, and Africa 700. In Europe

Great Britain and Ireland take premier position, with 17,000 engines; Germany has 15,000, France 11,000; Austria-Hungary, the second largest continental country, has 5,000.

LOCOMOTIVE SANDER—INSTRUCTION MODEL.

The improved pneumatic track sanding apparatus for locomotives designed and patented by Mr. Henry L. Leach of Cambridge, Mass., is well known among locomotive men. The advantage of being able to increase the adhesion between driving wheels and rails for considerable periods of time and without the disadvantage introduced by profuse sanding is rapidly becoming appreciated. The automatic sander delivers a uniform stream of sand continuously as long as desired and means are provided for regulating the amount accurately. Sand dropped upon the rails by means of the ordinary hand lever is likely to be delivered profusely and this not only increases the resistance of the train but also causes



more rapid wear of the wheels and rails than would be had with the continuous feeding of a small stream of sand.

The use of this automatic apparatus is now so general as to make it desirable that all locomotive runners and firemen should be familiar with its working, and this has led Mr. Leach to bring out the instruction model which is shown in the accompany illustration which was made from a photograph. This model represents a section of a locomotive sand box fitted with the pneumatic sanding apparatus and also with the old style of sand lever and valve. It is intended to serve the purpose of instructing men in the application, operation and care of the device and to enable them to perfectly understand its construction and manner of operation. In this arrangement of the parts the sand is delivered from the rubber tube shown at the left in the illustration. The weight of the model is 70 lbs. Mr. Leach states that they are used quite extensively in the instruction cars and rooms which have been fitted up upon many roads for the instruction of men in the use and care of locomotive attachments, air brakes and car heating systems.

THE PROGRESS OF AMERICAN CAR CONSTRUCTION.*

COL. H. S. HAINES.

It is an honor to be requested to address the Master Car Builders' Association, one which I appreciated when your president invited me to do so at your last annual meeting, and which I doubly appreciated when the invitation was renewed for this present occasion; for your association shares with the Master Mechanics' Association the distinction of being the pioneers in organizing the technical staff of the railroads of this country for the interchange of information and the diffusion of knowledge as to better methods and improved appliances. The success which has attended your efforts has incited officials in other departments to organize for similar purposes, and has opened the way to the American Railway Association, which has defined its object in its rules of order, as "the development and solution of problems connected with railway management in the mutual interest of the railway companies of America."

In the department of railway operation to which its members belong, this has likewise been the object of your association; and the conclusions which it has reached as to certain details of freight car construction have not only been accepted by the American Railway Association, but have been embodied by the United States congress in the railway safety appliance act. The good work which our master car builders have accomplished in the attainment of better methods and improved appliances is well understood by those who like myself began railroad life at an early age, and have since been closely connected with the management of railroads in this country.

As our minds revert to the past, how vividly we recall the low roofed cabooses which once served as passenger cars for the same class of travel that now obtains the most luxurious accommodation. For cabooses they were, indeed, with but scanty provision for comfort; but whether for day or for night travel, that was all that was afforded to the passenger, who marched from a train of such cars as weary and dirty as any tramp you may now meet along the highway. It due course the passenger car became less and less like a box car. It was lengthened and heightened; the deck roof improved its ventilation and its appearance. Conveniences of different kinds were added, but the great step forward was taken when provision was made for sleeping in a recumbent position while traveling. The traveler of to-day may well be grateful to Mr. Pullman for the manner in which this idea has been developed by him and by his imitators. But the man who first recognized the claim of a human being to stretch out his cramped up limbs in a railroad train, even though it was only on a hard plank, was the Columbus that discovered the sleeping car; and if he be unknown at present, the Master Car Builders' Association ought to appoint a committee to discover him, and then devote an entire page in its records to transmit his name to future generations.

The appliances for safety have kept pace with the appliances for comfort. One of the earliest which occurs to my mind was the sealing of the underside of floor joists, an improvement very forcibly impressed upon the mind of any one who ever participated in a derailment of an old time passenger car, when the car-body was snatched from the trucks and skidded along the rails, carrying out the floor joists as it went. And what an advance from the time of the old four-wheel truck, mounted on journal springs, without equalizers or ballast springs! And what a variety of all kinds of springs have been tried and condemned and scattered all along the road of improvement that has led up to our present six-wheel truck! There were wagon springs, carriage springs and gun springs; some made of elastic rubber and some made mostly of whiting; steel springs, half elliptical, double elliptical, duplex, triplex, quadruple, spiral, helical and some coils of wire stuffed in wool and packed in cases. And then there were air springs, so called, cylinders inverted like a tie bolt in receptacles filled with molasses that became gradually solidified by the dust gathered along the track.

And think, too, of the hand-brake applied to a single truck up to the quick acting air brake of to-day; a step in the march of improvement with which the name of Westinghouse is inseparably associated, as is the name of Pullman with the devolpment of the sleeping car.

Nor can we ignore the advance in car frame construction, even in this hasty glance backward; for the car body, which was at first little more than a weather shelter over a platform floor, has become a structure in which the materials are ingeniously disposed to offer the maximum of resistance to tensile and compressive strains. But the master car builder of to-day must be not only an engineer; he must be not only a master versed in structural strains and in devices to resist them; his construction must not only conform to the laws of mechanics, but he must be an architect as well. The structures which he rears, although they be on wheels, have become rolling palaces, indeed, in which those architectural principles must be regarded which have been held as true from the time of the construction of the Egyptian Pyramids, Solomon's Temple, the Athenian Parthenon and Mediaeval Cathedrals down to the present day of twenty-story sky scrapers.

Nor is this all. He must not only be an engineer and architect, he must not only furnish palaces on wheels for modern travel, but he must so decorate his structures as not to offend the highly cultivated tastes of his passengers. He must, therefore, be an artist besides. To satisfy their aesthetic cravings he must ransack the resources of decorative art. Mahogany, rosewood, satinwood, ebony and ivory are called into play, and mirrors and gilding, silks and satins, brocade and plush, in their varying hues, all deftly arranged and draped, so as to be in accord with the prevailing fashion.

It is, then, the work of the master car builder which mostly impresses the traveler by rail. Little does he know or care about the labor and thought which has been expended upon the roadbed over which he luxuriously runs, or of the bridges and tunnels, masterpieces of engineering, which bear him, almost in the twinkling of an eye, across mighty rivers or through the bowels of lofty mountains. As he lolls in his chair of ease he may bestow a passing glance upon one of those huge Titans of steel, devouring coal and scattering smoke from its nostrils as it speeds along its way. But of the ever watchful care of the train dispatcher and signal man he is as unconscious as of the will of Divine Providence; for the safety of the traveler concerns him less than that he shall be commodiously entertained as he journeys along.

With these demands the master car builder has complied with such earnestness that the American traveling public is housed as princes never were before. They must have not only cushioned seats, comfortable beds, and toilet accommodations, with hot and cold water always turned on, but dining halls as well, and observation cars, libraries and bath rooms. A barber shop, and even a typewriter must be at hand. To what greater length are you master car builders going in your efforts to pamper and spoil the American people?

Of course, the ladies who are here with us today have highly appreciated what their fathers and husbands have done to beautify and glorify the American passenger car, but what do they know or care about the success which you have attained in a matter of much more importance to the railroad companies—that is, the construction of a freight car? For just as you have developed the American passenger car from what I have styled a caboose, so you have wrought out the American freight car from what I will term a wagon or truck. Look back for a moment and think of the little box car of six and ten thousand pounds capacity, and compare it with our present 60,000 lbs. car, framed to resist a variety of shocks and strains to which no other structure on earth is exposed.

In the contest between the standard gage and the narrow gage track, in which we were all intensely interested some 20 years ago, the promotors of the narrow gage idea were never tired of expatiating upon the advantage which it offered, of a greater weight of paying freight in proportion to the weight of the equipment. It is true that they also claimed a saving in the cost of railroad construction, but that was their principal argument, that the cost of transportation per ton per mile would be greatly lessened on the narrow gage roads, by reason of this reduction in dead weight, and they thus induced a useless expenditure of millions of dollars on thousands of miles of narrow gage road, nearly all of which has since been changed to standard gage. Why has it been changed? Mostly because the master car builders have been steadily reducing the proportion of dead weight to load on the standard gage until now they have produced a car which will carry 60,000 pounds or more of paying freight on less than 30,000 pounds of dead weight.

But we must not look altogether to the past for your victories, for you have to win still further triumphs in this direction. While in the construction of passenger cars it would be idle to offer any suggestion as to increasing the safety or the comfort of the passengers, unless it may be in the matter of improved lighting and ventilation, still it does seem in the attainment of these ends you have not sufficiently regarded this matter of the dead weight; for, with the demand for higher speed, the weight of trains becomes a factor of increasing moment. The express locomotive of latest design can maintain a speed of 60 miles an hour over roads of average grade and alignment, with a train of five cars, weighing, say 300 tons. But that is about the limit of their efficiency at that speed. The grade and alignment of our roads are, of course, practically unchanged. The steam capacity of locomotives is limited by the possible heating area and grate surface; and these again, are restricted by the width of gage and the necessary clearance, so as to obtain a still higher

*Address delivered at the Master Car Builders' convenat Saratoga, June 17.

speed, we must either still further restrict the weight of trains or have recourse to the expediency of double-headed passenger trains. As soon as a high speed train is put on any road, the officials in the passenger department at once want more accommodation on the train. They would like to have, if possible, a sleeping car to every point of competition. Now, can you not to some extent respond to that appeal by furnishing a train of six cars that will weigh no more than our present five car train, and still preserve the same relative seating capacity and retain the same conveniences for travel? It does seem to me that there is a hint to be obtained from the recent evolution of the bicycle.

In the construction of freight cars you still have this matter to meet of the relative weight of trains to speed. The practice is becoming general to rate freight engines by the weight of the train rather than the number of cars; and whenever the freight rates of this country are recognized as being fixed beyond the possibility of disturbance by rebates and other illegitimate concessions the favor of shippers is going to be solicited by more frequent and speedier deliveries. Both these considerations call for lighter and strong freight cars.

Whenever I have had occasion to place a contract for equipment I have been impressed with the necessity for minute and accurate plans, specifications and bills of material. It is here that a dollar counts one way or the other. If in placing a contract for a thousand cars there is an omission of one dollar's worth of labor or material on each car, it amounts to a clear profit of a thousand dollars to the contractor.

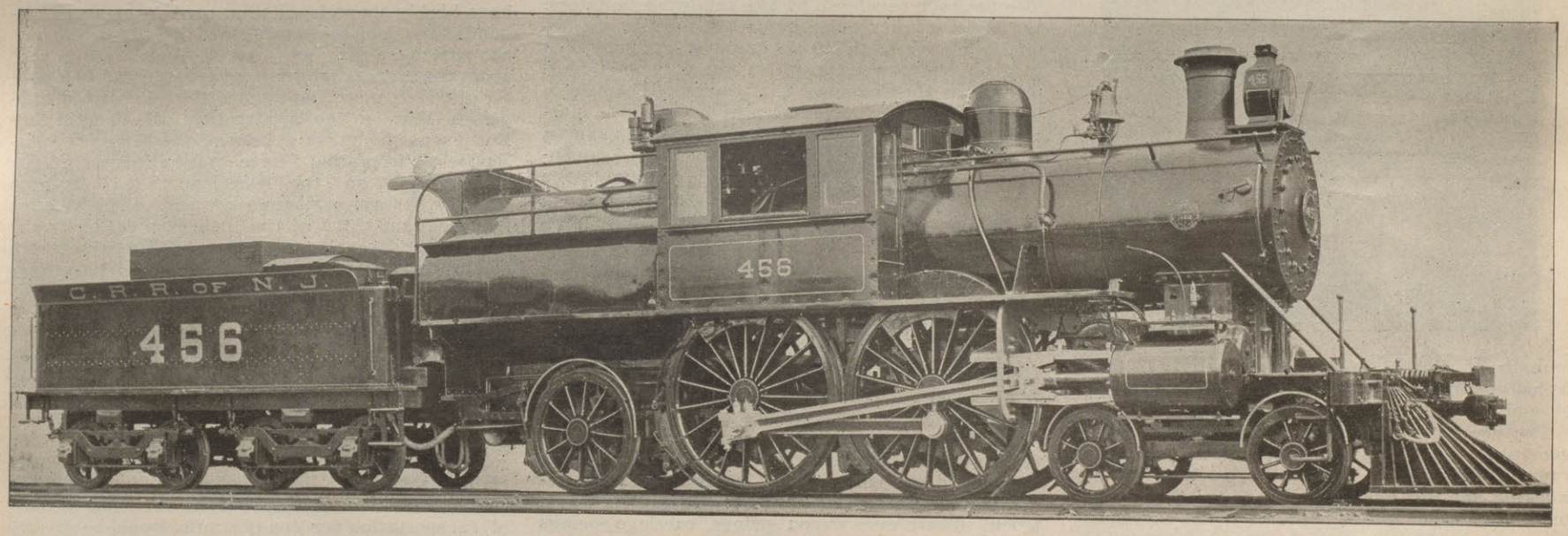
This fact also emphasizes the necessity for thorough, continual and intelligent inspection of cars while being built under contract.

The establishment by your association of a standard journal and axle box has been of great economy to the railroad companies, and it is much to be desired that some conclusions might be reached as to other details of freight car construction; as, for instance, a standard body bolt, that for a 60,000 lb. car would retain its rigidity under hard service. I might continue to mention, as they occur to me, other features in your department which invite consideration, but I must not forget that my address is but an incident in the program with which you have to concern yourselves at this meeting.

Have you ever reflected upon the effect which the use of the four-wheel truck on American railroads has had upon the social life of our people? Any one of you who has traveled on an English railway train must have felt the difference in being caged in a compartment with six or eight persons, and not having the free run, as in one of our trains, from the smoker to the observation car. Now, this difference is fundamentally due to the evolution of an English railway carriage from a stage coach. In fact, it is not so much the evolution from a stage coach as it is the fastening of stage coaches together, back to back, In thus keeping the carriages separate, the company has been separated also, the sheep from the goats, and the classification, originating in days when there was a strong social reason for it, in the days when the gentry traveled in their own carriages, business people traveled in stage coaches and the common people traveled in wagons, has been maintained in the English railways, long after the social reasons for it have been greatly lessened. Now, if the bogie or four-wheel truck had been adopted in England in their railway equipment, we should doubtless have seen somewhat the same results there as we have in this country; that is, long cars, with no side doors; and communication through the entire train. Hence, we have people moving from car to car, and seeing who is on board, and finding their friends, making acquaintances, and maintaining a general circulation of ideas and information, which assists in keeping the whole train load of passengers, of all sorts and kinds, from stagnating and separating into strata or different social elements. In the same way the train conductor has been brought into social contact with his passengers, and has thereby become an official to whom they look for direction and advice, instead of a guard to be tipped with a sixpence. And this use of the pivot truck has made it easier for us to provide sleeping berths and toilet atcommodations, and dining cars, and other conveniences which cannot be so rapidly provided on equipment built on English lines of practice.

It has been intimated that these technical associations of railroad officials tend to discourage the application of the inventive mind to the improvement of railroad appliances. Now, it is hardly to be expected that this generation will witness any more such striking improvements as the air brake, the automatic coupler and the vestibule platform; for with each fundamental discovery or invention, or novel application of familiar forces and appliances, the field for original research becomes narrower, mainly as to controlling features of equipment, partly as to details, and in no other department about a railroad is the necessity for uniformity so important as in that equipment which is to be generally interchanged throughout our country. Any principle, any device, any tool, which restricts such general use, must, either be modified to meet this requirement or must be rejected, although it may be otherwise be meritorious. The principal value of your association is to determine in what respect this uniformity is essential, and in what respect it is undesirable. In doing this, you fix the limits within which inventors must work for the result of their labors to be available. Within these boundaries they are free to exercise their ingenuity, and they are assisted to concentrate their efforts, for their own benefit, by reason of these very restrictions which you place upon them. This was roughly illustrated in your action with reference to freight car couplers, for your association laboriously and thoughtfully arrived at a type best suited for this purpose, and still left the field free for inventors to devise any kind of a coupler which would conform to this type, to certain contour lines and other conditions essential to interchangeability among their several devices. The way was thus made clear for the introduction of many different couplers, each having its particular merit, and yet all interchanging. But for this action by your association there would have been a contest for recognition among different types of couplers, incapable of coupling with each other, sustained by powerful and interested advocates, and we would probably have seen a war of the couplers as we saw a war of the gages, and with great exposure, and long continued, on the part of railroad employes, to accidents. Therefore your action in compelling such uniformity, has not been of benefit to the railroad companies alone, but the air brake and the vestibule platform coupling automatically, have almost eliminated the possibility of a fatal injury to a passenger from abutting collisions. With the general adoption of the master car builders' type of freight car couplers, switching will cease to be a hazardous occupation, and the general application of air brakes to freight trains will, it is to be hoped, bring down the brakemen from the top of the cars and free him from exposure to the weather greater than the storm-tossed sailor suffers, and reduce the accidents incident to low bridges and tunnels. It is because these several safety appliances have been made uniform in their action that we are about to receive the full benefit of their application to the million or more cars that are now used in going from the Atlantic to the Pacific and from the Great Lakes to the Gulf of Mexico. Now these great advantages to the public and the railroad employes could never have been enjoyed but for the mutual action of the railroad companies in this country, made practicable by your association, which is thereby becoming a public benefactor as well as a valuable auxiliary to the railroad companies which you represent.

As I look around me and think how many men of the representative men of this association have arisen from the ranks, I recall the time when I took my dinner pail with me to my work, little dreaming that I should ever be honored with an invitation to participate in an occasion like this. Many of you have had the same thought pass through your minds. It may not, therefore, be out of place in my closing remarks for me to mention something else which has probably occurred to some of you. In railroad life, as in other careers of usefulness, the way to eminence does not lie among the alluring fields of recreation and ease, but along the rugged paths of application, self-restraint and self-improvement. I earnestly wish that this thought could be impressed upon the minds of the young men filling the railroad ranks to-day, that they must be industrious and economic, studious and tractable, if they would secure for themselves that domestic happiness which to most men makes life worth living, and which has drawn with you here to-day your wives and your daughters to grace this occasion with their presence, and to make of it a social event, as well as an opportunity for the discussion of technical questions relating to matters in connection with your duties as master car builders.



NEW FAST PASSENGER LOCOMOTIVE—CENTRAL RAILROAD OF NEW JERSEY.

FAST PASSENGER LOCOMOTIVE—CENTRAL RAILROAD OF NEW JERSEY.

The accompanying illustration was taken from a photograph of a new fast passenger locomotive built by the Baldwin Locomotive Works for the Central Railroad of New Jersey. The locomotive has ten wheels and in general appearance resembles the Columbia type except that the leading truck has four instead of two wheels. The cab is placed about midway of the length of the boiler, and in this respect the engine resembles the appearance of the Columbia type with Wootten fire-box which was built for the Philadelphia & Reading Railroad, and exhibited at the Columbian Exposition in 1893. The engine illustrated is provided with a water tube grate for burning anthracite coal, and has single expansion cylinders 18¾ x 26 in., and piston valves. The driving wheels are 84½ in. outside diameter and 78 in. over centers. The following list gives the chief dimensions of the engine:

Cylinders	18¾ x 26in
Driving wheels, outside diameter	84½ in
Driving wheels, center	78 in
Driving axle journals	8½ x 12 in
Total wheel base of engine	26 ft. 5 in

Driving wheel base	7 ft. 3 in
Weight in working order, total	141,000 lbs
Weight on driving wheels	80,000 lbs
Boiler, straight diameter at smoke-box	58¾ in
Tubes, 1¾ in. dia., number of	278
Tubes, length of	13 ft
Fire-box, length	113⅞ in
Fire-box, width inside	96 in
Fire-box, thickness of side and back sheets	⅜ in
Fire-box, thickness of crown sheet	⅜ in
Fire-box, thickness of flue sheet	½ in
Grates, water tubes and cast iron bars	
Smoke-box, short extension	
Truck, four-wheeled, diameter of wheels	36 in
Truck wheels wrought center, steel tired	
Truck journals	5½ x 12 in
Crossheads steel, alligator type	
Tires, thickness of	3½ in
Tires, width of	5¾
Axles	steel
Driving boxes, cast iron with phosphor bronze bearings	

The engine is fitted with two Metropolitan No. 10 injectors, with Westinghouse, American outside equalized brake on driving and trailing wheels and also the Westinghouse brake on the tender and train. The tank has a capacity of 3,500 gallons, and is carried on two four-wheeled equalized trucks. The tender frame is of iron, the wheels are 36 in. diameter of wrought iron with steel tires. The tender journals are 5 x 8 in. The heating surface of the engine is as follows: combustion chamber 53.8 sq. ft., tubes 1644.9 sq. ft., fire-box 136 x 4 sq. ft., giving a total heating surface of 185.13 sq. ft.

THE TRANS-SIBERIAN RAILWAY.—From Russian sources comes some information regarding the progress which is being made with the construction of the Trans-Siberian Railway. The line is being constructed in sections, which are being built simultaneously, and the first at the European end of the line is now completed, so that it is possible to travel direct from St. Petersburg to Omsk, a distance of 2,673 miles. On the next section of the line, that from Omsk to the Obi river—384 miles in length—the rails are laid the whole distance, but the earthworks are not complete. On the next section, that from the Obi river to Krasnoyarsk, 467 miles, the rails are also laid, and a beginning has been made of the iron bridge, nearly half-a-mile long, across the Obi, that is to join the two sections. On this section many of the smaller bridges are built, and half the earthworks are completed. The next section is to Irkutsk, a distance of 672 miles, and it presents many difficulties, the most important of which, however, have been overcome. Nearly two-fifths of the earthworks are finished. Beyond Lake Baikal the distance to the head of the Arneer navigation is 701 miles, and in this section work has been begun from the Pacific end but the difficulties are very great, and much tunnelling will have to be done, as the line has to rise to a plateau over 3,500 ft high. The next section, however, presents the greatest difficulties as the line has to be carried through a marshy region which during the heavy rains is often completely submerged. The line from Vladivostock is completed for 250 miles, but there can be little doubt that Russia is aiming at a post of the Pacific coast which will be open the whole year through, so that her forces may always be at her command. How this is to be obtained is one of the problems in the Far East, and its solution may be more difficult than the building of the Trans-Siberian Railway.

BALANCE SLIDE VALVE.

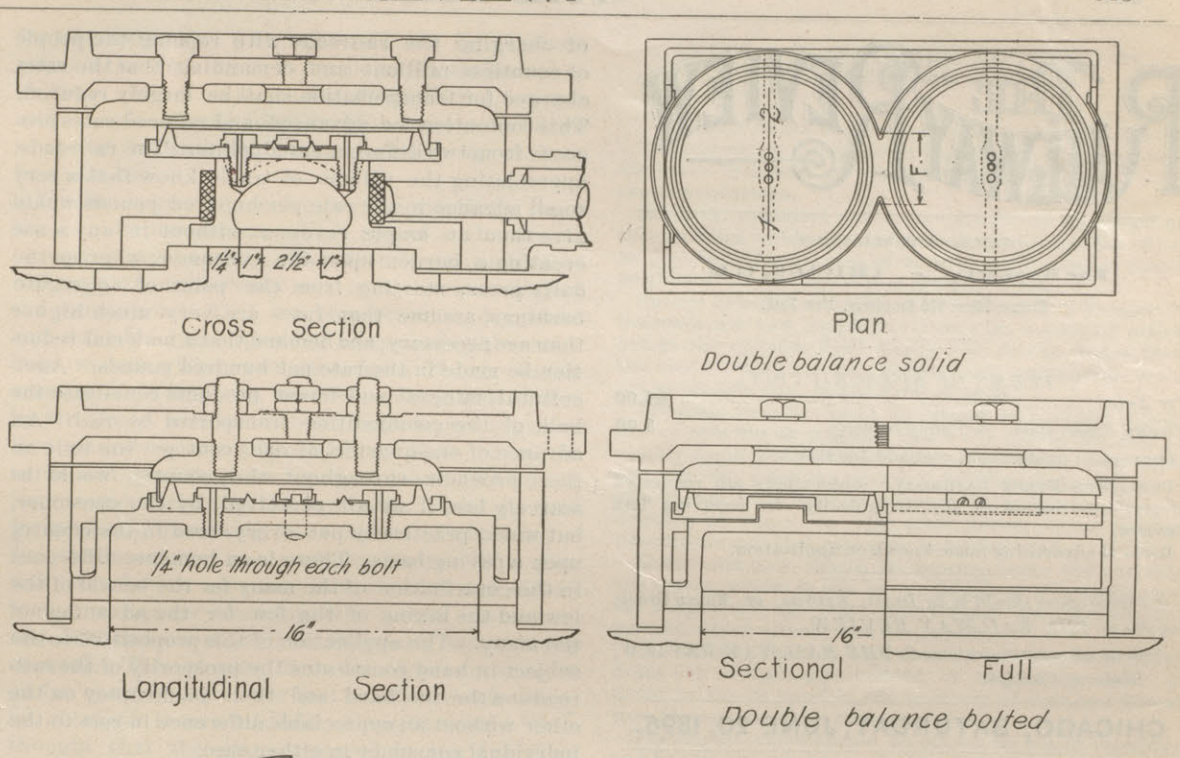
Having received several inquiries with regard to the method of balancing locomotive slide valves since the presentation of the paper by Mr. L. R. Pomeroy, upon this subject before the New York Railroad Club in December of last year, it appears that balancing is not perfectly understood with particular reference to the method of calculating the area which is employed and with the consent of the American Balance Slide Valve Company of Jersey Shore, Pa., the details of construction of that form of valve, the method of balancing and the formulae employed for proportioning the balancing areas are given here.

In order to figure the area of balance for plain valves, the area of one steam port, both bridges and the exhaust port are added together and to this is added 8 per cent of this sum if single balance is used, and 15 per cent if the double balance is used, the difference between the construction of the single and double balance being apparent from an inspection of the accompanying illustrations. For example in the case of a single balance, suppose the steam port to be 1¼ in. wide, the bridges 1 in. wide, the exhaust port 2½ in. wide, and the length of the ports to be 16 in., the balance would be figured by adding together 1¼ in.; 1 in., 2½ in., and 1 in. which would equal 5¾ in., multiplying this by the length of the ports which is 16 in., the product being 92 sq. in. 8 per cent of 92 in. is 7.36 sq. in., which added to 92 in. equals 99.36 sq. in., which is the area to be balanced and the nearest even diameter to obtain this being 11¼ in. this is taken for the dimension of the circular ring to be placed upon the top of the valve. The same example worked out for double balance would consist of the same operation except that 15 per cent of 92 or 13.8 sq. in. would be added making the area 105.8 sq. in., which divided by 2 gives 52.9 sq. in. for the area of each ring and the balancing would be accomplished by using two rings 8¼ in. diameter each. For an Allen ported valve the same formulae is used but the area of one side of the Allen port is subtracted from the balancing area.

The ring and the disc are made of hard close grained cast iron and the joint plate of soft tough cast iron. The latter is fastened in place with two ¼ in. machine screws having countersunk heads and these screws are riveted over on the bevel face of the ring after which they are chipped down so as to clear the conical surface. The rings are turned slightly smaller than the diameter of the conical face to give them the proper tension. The drawings show the method of relieving the pressure from the space inside of the balance ring and under the bearing plate, by means of quarter inch holes through the bolts. They also show the new method of attaching the discs to the valves by means of an inside instead of outside lugs, as were formerly used.

In using the outside lugs the top of the valve is required to be bored to fit the outside diameter of the disc. The lugs are therefore a different distance apart for each sized disc and in double balance it may happen that there is not sufficient room on the valve to leave corners beyond the radius of the disc at the ends of the valve for making a proper lug. It is therefore seen to be a great improvement to be able to fasten these discs by a lug at the center.

Another improvement which has been made in the balance rings of valves recently furnished to the Wisconsin Central Lines consists in broadening the ring at the top so as to increase its width to 19-32 in. To do this the section of the ring has been changed to the form of a T. In making improvements in their valves these manufacturers have kept in mind the advantages which are to be gained from reducing the number of sizes to a minimum whereby the cost of both construction and maintenance are reduced.



THE AMERICAN BALANCE VALVE—FIG. 1—SINGLE AND DOUBLE BALANCE.

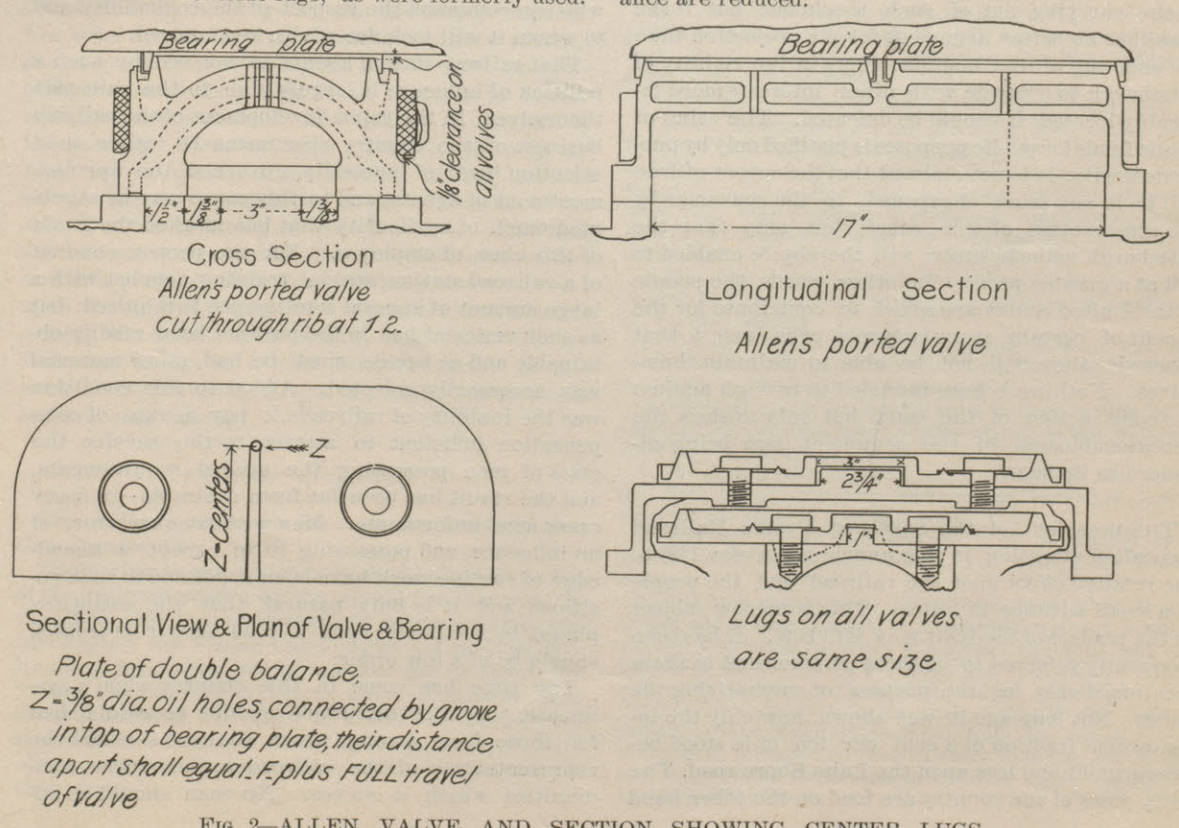


FIG. 2—ALLEN VALVE AND SECTION SHOWING CENTER LUGS.

THE RAILWAY REVIEW

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THE decrease in pig iron production during May of 7,000 tons per week, supplemented by an increase of stock of 4,000 tons per week leaves the market about where it was. Signs of weakness were developed by the anxiety of a few large producers to sell. The steel billet pool is driving a certain line of consumers to consider the wisdom of erecting their own steel plants. The market is manipulated into abnormal condition. A fair but not stimulating demand exists in all branches of the iron trade. Combinations maintain their grip. Consumers do not believe these influences can be permanent. Railroad companies are still cautious buyers. Every interest awaits more favorable conditions. The opinion exists that the latter half of the year will be more satisfactory than the first half. There is certainly a large amount of urgent work in hand.

PITTSBURGH iron interests are much exercised over the report that Mr. Rockefeller intends to establish a large steel plant in the vicinity of Cleveland, which in connection with his steamboat line and ore properties, will enable him to largely control the iron output in the United States; and they are urging that the proposed ship canal across the state of Ohio shall be pressed to a completion in order that they may be placed upon an equality with this new enterprise by having water transportation to their doors. As to the reliability of the report or the effect upon the iron industries we know nothing, but allowing it to be true, it affords no reason why the canal should be constructed. It is possible that the commercial interests of the country at large would be benefitted by the carrying out of such a scheme, but if the canal has no better argument for its projection than the enabling of iron manufacturers in the vicinity of Pittsburgh to compete with other interests more favorably located, it should be defeated. The using of public funds for public purposes is justified only by public necessity. It is not claimed that the output of iron will be in any sense cheapened, to the consumer by the construction of this canal, but only that the Pittsburgh manufacturers will thereby be enabled to sell at a greater profit. In other words, the people of the United States are asked to contribute for the benefit of certain manufacturers who assert that otherwise they will not be able to maintain themselves. Nothing is here intended to inveigh against the construction of the canal but only to show the unreasonableness of the argument now being advanced in its favor.

THE president of the Southern Pacific Railroad has called attention in his annual report for 1895 to the relative effect upon the railroad and the people of a small advance in rates. This is no new subject to the readers of the RAILWAY REVIEW. It has been frequently referred to in these columns and is again mentioned only for the purpose of emphasizing the point. Not long ago it was shown how only the infinitesimal fraction of a cent per ton mile stood between profit and loss upon the Lake Shore road. The daily press of the country are fond on the other hand of charging the railroads with robbing the people of countless millions and demanding that the rates charged for transportation shall be largely reduced. This contention for advanced and reduced rates proceeds from two different standpoints. The railroads, appreciating the volume of traffic know that a very small advance in the rate per hundred pounds would give them an ample revenue without in any sense creating a burden upon the consumer; whereas the daily press, starting from the point of aggregate earnings, assume that rates are very much higher than are necessary, and demand that a material reduction be made in the rate per hundred pounds. Agricultural, mineral and forest products constitute the bulk of the commodities transported by rail. An advance of one-quarter of one cent per ton mile on these products throughout the country would be scarcely felt, if at all perceived, by the consumer, but would practically put every road in the country upon a paying basis. There is an immense difference in the contribution of the many for the benefit of the few and the taxing of the few for the advantage of the many. The application of this proposition to the subject in hand constitutes the prosperity of the railroads on the one hand and their bankruptcy on the other without an appreciable difference in cost to the individual consumer in either case.

THE TRUE POSITION OF THE RAILWAY STATION AGENT.

The address of the president of the Atchison, Topeka & Santa Fe Railroad before the Convention of Railroad Station Agents held in Chicago during the past week, was noteworthy in that it recognized in a forceful way the importance and dignity of that class of railway employes. This address, a portion of which appears in this issue, should be placed in the hands of every railroad agent in the United States. Mr. Ripley is not only master of his subject but has the advantage of being honest in what he says, instead of talking for effect, as is too often the case with utterances of this character. If by reason of his address railroad station agents throughout the country shall be incited to dignify their office to the extent that properly attaches to it, a distinct step forward will have been made in railway operation.

The American railway station agent occupies a unique and responsible position. He stands as the representative of the railroad in the community in which he lives and the estimate placed by the community upon the railroad is largely predicated upon his character and conduct. In the majority of cases he represents the largest commercial interest of the community and has it in his power to shape to a large extent the character of its business. It is also true as suggested by Mr. Ripley in his address, that he can do much to shape the political affairs of the community particularly in their local relation. In other words, he may and should be a man of affairs who can command the respect of the community and to whom it will look for advice and counsel.

That railway station agents do not occupy such a position of influence is largely due to the railroads themselves. In the rapid development of the railway business of the country circumstances rather than selection have of necessity governed the appointmentment of agents, and to this cause may be attributed much of mediocrity that has marked the grade of this class of employes. For the proper conduct of a railroad station, special training coupled with a large amount of general intelligence is required, but as such material has in the past not been readily obtainable and as agents must be had, other material was necessarily selected. Added to this condition was the inability of railroads to pay a rate of compensation sufficient to attract to the service the class of men possessing the needed requirements, and the result has been far from desirable—in many cases most unfortunate. Men without character, of no influence, and possessing little except a knowledge of routine work have been appointed to such positions and it is only natural that the estimates placed by the public upon a road thus represented should be of a low order.

The time has come in this country when a systematic course of instruction should be established for those from among whom shall be selected the representatives of the railroad in the various communities which it serves. No man should be appointed to such a position who does not possess to some extent the qualities necessary to make his administration a successful one. It is not enough that he should be able to handle train orders, make waybills and expense bills, properly report overs and shorts, check freight in and out, collect and remit charges, etc., etc., but he should be advised of the general condition of the road, its facilities for doing business, and the reason why certain things apparently desirable to the community cannot be done. He should as the representative of a large and influential corporation, know of the affairs of the town in which he lives so as to be best able to contribute to its growth and prosperity. For such a list of qualifications something more than the training one ordinarily gets in a local station is necessary, but that it is necessary is apparent.

How such a training may be accomplished is somewhat difficult to prescribe. Evidently, however, the first step is to dignify the office, both as to position and compensation, so as to constitute it an attraction for the class of men needed to fill it. At the present time the transfer from station service to genreal office service is regarded as a promotion, but it is without doubt true that the reverse should be the case. Experience would seem to suggest that the proper course of education for the responsible position of agent would be to go through the successive steps of station service, beginning with the smaller and proceeding through the larger stations to the general office. In such a course all the various steps necessary to a complete knowledge of details would be taken. In connection with this last service should be established a school of railway economics in which the principles underlying the railway business, as well as the relation of the railway to the public, should be thoroughly taught. Such a course of training would furnish a class of men who by their knowledge and ability would be an acquisition to the communities to which they might be assigned and competent representatives of the interests for which they stood.

In this progressive age it is the specialist who comes to the front, and in no line of commercial industry is the specialist more needed than in the railway service. The haphazard and expensively economical methods that have hitherto prevailed in this connection must give way to scientific and well ordered ones. Railroads are just now in the most critical period of their existence, and only in an appreciation of the needs of the future is there any hope for their continued prosperity. The entire system needs a thorough rehabilitation, and in this reorganization the properly equipped station agent will occupy a prominent part.

FEATURES OF THE M. C. B. CONVENTION.

The convention opened at Saratoga on Wednesday with every indication of excellent meetings and with a good attendance; and while the editorial correspondence received before going to press covers the first day only the distinctive features of the convention may be fairly outlined from the work of the opening hours. The most interesting, and in fact the leading subject of the meeting, is the application of steel to the construction of freight cars, showing beyond a doubt that the idea is now securely established in the minds of most of the members, that herein is to be found the solution of many troublesome questions with reference to car building. In fact the steel car is the car of the future, and besides the many practical advantages to be gained by its introduction attention is called to the possibility now offered as never before by means of which a standard car may be had. The committee stated in the report, which is given nearly in full elsewhere in this issue, that as long as the framing of foreign cars coming upon different lines is constructed of timber which may be worked by ordinary carpenter's tools, and as long as the iron work consists of bolts and round rods which may be made and cut off to sizes by any smith, the odd sizes of sills and other parts is not as important as it will become when these parts will be of steel shapes, which require special and heavy tools for fitting and working, and when specially rolled shapes will be required in construction. It is true that repairs will probably be less extensive and especially as regards such heavy parts as sills and large pieces, yet these may cause great delays if it is found

necessary to apply to the mills for parts for certain cars.

It seems natural therefore to inquire why not start out at this early stage with certain definitely fixed standard dimensions and perhaps also fixed shapes and sections for each class or type of car. The same result would appear to be possible which followed the standard requirements upon which the various Master Car Builders' couplers have been developed. Enough restriction was placed upon the designs to insure interchangeability and yet the inventive faculties of coupler designers were given free enough scope. Why would not the same plan work out in a similar way in car construction? And if so, the advantages are sufficiently apparent to warrant some boldness and perhaps even venturesomeness on the part of the association. On this point the committee directs attention to the desirability of issuing standards in advance for the guidance of the railroads instead of waiting until after the necessity for such standards has led to the use of a multiplicity of designs, which add greatly to the expense and delay in car repairs. To quote from the report, "Car building is anything but an exact science, and the evolution of a standard design for an iron or steel car frame must come after many experiments, errors and failures, profiting by which experience we will ultimately achieve success. This question brings out forcibly the present lack of uniformity with special reference to the length of cars; and to quote again: "Even if the members of your committee felt that they could present a design for standard steel framing for freight cars which would be practically perfect and require no future modification,(which is not the case), it would not be practicable to do so until greater uniformity in the lengths and sizes of interchange freight cars for given capacities has been brought about. It is hoped that a thorough inquiry into the subject will be made by the association by means of a committee to recommend standard lengths of sills and widths over sills for refrigerator, box, stock, flat, drop bottom and drop end gondola cars of 60,000, 70,000 and 80,000 pounds capacity and that the association will adopt such standards." With this as a starting point the development of a standard underframe may be accomplished. It seems plain that the good which would result from this procedure ought to be sufficient inducement to lead to an attempt in this direction, especially in view of the fact that there is no good and sufficient reason why standard lengths and widths should not be adopted.

In the closing paragraphs of the report figures are presented to show the saving to be expected from the introduction of this material in car construction. It is shown that steel construction may result in an earned interest of thirty-six per cent per annum on the extra capital invested, which is stated to be sufficient to cover the depreciation and interest charges under the conditions assumed. These conditions consist of a saving of about six days per car per annum of the number of days which would ordinarily be spent upon the repair track, and while this margin is sufficient basis for expecting the thirty-six per cent interest, the question arises as to what effect the delay of two weeks or more would be in case that time should be required for getting necessary repair material. This is certainly a factor to be reckoned with, and the introduction of steel into car building furnishes at once the best of reasons for establishing uniformity and the possibility of attaining it.

The question which occupied the greatest amount of attention last year, the revision of the interchange rules, has not lost its importance in the slightest degree, but from present indications the experience with the Chicago interchange during the year has proved convincing to nearly,if not quite all,the members who stood out against it at Alexandria Bay. There seems to be no doubt of the adoption of the report of the committee which is based squarely upon the Chicago agreement, and there seem only a few details to be decided. The situation is such as to lead to the conclusion that the new interchange is going through in any event, even should the association refuse to ratify and endorse it. There has been perhaps a misunderstanding of the plan and much uncertainty as to its effect upon certain roads having very long lines. There has been a tendency to await the action of neighboring and connecting lines for the reason that the plan would not be of much value if the time saved at one point should be lost at another. These obstacles are disappearing, and an estimate placing the adoption of the new interchange as one of the features of the convention appears to be a safe one.

In the matter of conducting the meetings there are two improvements which are of such value as to merit special notice. The first is the method of calling the membership roll in the first session of the convention. This has been practiced for years, and valuable time spent in ascertaining the members present. The resolution for a change in the manner of finding out who is present was offered by Mr. Soule, and the substitute is a card registration whereby the members will put their names on cards and hand them in for the record. This is an improvement which will be valuable. since the time for properly discussing the subjects which come before the association is already too short. This plan will also insure accuracy in the record and will afford a means for knowing who are in attendance, the late comers as well as the early ones being counted. This change, however, does not seem to go far enough to give the best benefits which are to be obtained from a method of registration. It is thought that the plan employed by the American Society of Mechanical Engineers, some excellent features which would work out well in this and the Master Mechanics' Association conventions. The plan referred to consists of a register book with the lines numbered, upon which the names are written. This number is placed upon a small badge and is worn by the member, and as the list is printed from the register book every morning during the convention it becomes possible for every member to know the names of any others by referring to the list. The result is shown in the sociability among the members of the mechanical engineers which is characteristic of their meetings, and is a consequence of the possibility of a member introducing himself with confidence.

The other feature is the noon hour discussions which have been started at this convention with a vigor and life which attracts comment from the members on account of their success. It is found difficult in many technical associations to get good topical discussions, though the benefit to be derived from them is freely acknowledged. The means for doing this have been discovered at Saratoga, and they seem to consist of a careful selection of subjects which are not only live questions, but selected with special reference to brief discussions, also the publication of the list before the convention renders it possible for members to prepare data for discussions and the attention to preparation with a view of properly introducing the subject. The question needs to be opened by a quick thrust which will state the case from one or another standpoint, and the introduction being placed in the hands of a member selected to bring it out gives the necessary impetus. The brief allotment of time also favors good talking, and it would seem to be a good rule to limit the time of discussion to one period of ten minutes to be extended to two periods of this length if ordered by the meeting. It seems to be a mistake to keep adding on ten minutes to the number of four periods as was done the opening day in the discussion of the subject of the breaking in two of trains. The best talking was done during the first half of the time, and it is probable that more thinking would be done upon the subject if they were not allowed to be elaborately discussed. It is evident that these discussions may easily be a most valuable factor in the work of the conventions, and the right track seems to have been taken.

Coupler Litigation.

The following note has been sent us by the Trojan Car Coupler Co:

"Referring to the notice published last week in one of the railroad papers by the Gould Coupler Co. to the effect that they proposed to proceed with the suit against the Trojan Car Coupler Co. as if no preliminary injunction had been asked for by them, the Trojan Car Coupler Co., have only to request that those interested will apply to either the Eastern or the Western Railroad Association, as to the finality of the recent decision, by the court of appeals, in their favor."

MASTER CAR BUILDERS' CONVENTION—REPORTS OF COMMITTEES

LOCATION OF AIR BRAKE CYLINDERS ON FREIGHT CARS.

The committee appointed to report upon the location of air brake cylinders on freight cars made the following recommendations:

Air-brake cylinders and reservoirs should be placed on cars on a line inside of stake pocket as near center of car as possible. A clearance of at least twelve inches should be allowed for the removal of cylinder head.

Special attention is called to this point, as a number of railroads are now locating cylinders in a position which brings the cylinder head within four or five inches from the needle beams or other parts of car, preventing, without great difficulty, the removal of head.

The main air pipe should be located as near the outside line of side sill as possible. This will enable the men to readily reach and clean the drain cups in main air pipe, and will also place the pipe in a position on gondola cars, where the least possible injury will be caused by the dripping of water on pipe after having passed through bituminous coal that cars may be loaded with.

The cut-out cock should be located under the car near the center, where it can be reached from either side, and be subject to the least interference by irresponsible parties, which already has developed.

The air-brake branch pipe should be connected to top of drain cup in main pipe instead of bottom, in order to avoid, as far as possible, the tendency of dust and dirt to pass through strainer to triple valve.

The release valve should be placed on top of reservoir and handle extended to each side of car.

When necessary to provides holes in the needle beam or other parts of car to accommodate rods or levers, the committee recommends that they be made sufficiently large to allow ample space for the operation of rods or levers, as it has already been found that openings provided have been so small as to prevent rods from moving.

Rods should be parallel with line of car, as far as practicable and properly supported with hangers, to avoid binding and breaking of piston sleeves.

The committee received, after its appointment, a communication from the secretary, stating that it was the desire of the president that it also take up the question of, and incorporate in its report, a method of marking hose, so that the lifetime and service of hose could be more carefully and intelligently followed up.

It is known that some of the leading manufacturers are now marking the hose which they manufacture. Their plans were considered,together with additional points that the that the committee considered essential, in order that the highest uniform degree of efficiency may be reached in hose.

The number of months' guarantee was omitted, as in the opinion of the committee this is a question between the railroad purchasing and the manufacturer, and by requiring that all hose be plainly marked with the initial of the road purchasing and manufacturer's trade-mark or name. and also a time guarantee, the character and service of the hose can be readily followed up, and such hose, with a very limited time guarantee will soon develop to the purchaser and manufacturer its inferiority or superiority compared with other hose.

Size of letters and figures to be not less than one-quarter of an inch.

The committee, in these recommendations, has endeavored, as far as possible, to cover this important subject, and at the same time to recommend a method covering the maintenance of same, that would appear most beneficial in all respects and bring a uniformity that would overcome the trouble and expense experienced by all concerned at the present time.

The committee desires to extend its thanks to the companies which have favored it with much valuable and very useful information pertaining to the subjects handled by the committee.

COMMITTEE ON FREIGHT CAR DOORS AND ATTACHMENTS.

This committee sent out circulars for information and from the replies presented a list giving the styles of doors and the number in use upon each of the roads which were heard from, after which the following recommendations were made with reference to what was considered necessary to the production of an ideal door for box, stock and other cars.

1. The door should be so constructed as not to be liable to bind or give trouble in working on account of swelling or warping slightly.

2. The door should be hung at the top with no rail at the bottom which can be bent, and from being bent, interfere with the free running of the door.

3. The door should be so hung so as to move readily by a small amount of force when applied either at the bottom, middle or at the top.

4. The door should not move easily enough to roll back and forth by the alternate forward and backward jerks that the car gives in a freight train.

5. The door should be so arranged as to be weather and cinder proof at the top, bottom and both sides when closed.

6. The door should be so constructed that when it is locked and sealed, it would be impossible, without breaking and mutilating the door, to pry open the back end or bottom of the door, so as to permit entrance of the hand or hook to pull out portions of the lading.

7. The door should be so constructed that if the lading presses against it and bulges it out from the inside when it is closed, it cannot be pressed away from the car so as to swing out and strike passing trains or other objects at the side of the tracks.

8. The door should be so constructed as to make it absolutely proof against unhanging, excepting where the stop, against which it rests when open, is removed and the door taken off in the regular way.

9. The door should be so constructed as to prevent it swinging out when in its closed position, even though all of the bottom brackets are removed.

10. The door should be so constructed as to be proof against swinging out when in its closed position, in case one of the hangers should be broken or lost off.

11. The door should have such a style of locking arrangement that it cannot be removed or tampered with from the outside, without at once making the fact known to the seal record taker as soon as he sees the fastening.

The above conditions should be considered as applying to end doors as well as side doors, with special reference to locking arrangements, which should have the same, or equal, provisions for sealing.

The committee referred to the danger to life and property incurred in the handling of private line cars equipped with hinged doors swinging outward. In the opinion of the committee such doors are much more dangerous to passing trains than any other type of freight car door extant. Such doors are inherently dangerous, from the fact that if unlatched they will gravitate to open position on the slightest oscillation of the car. Again, in many cases, they swell to such an extent as to prevent them from closing properly. The fastenings are also continually getting out of order. The committee urged action by the association looking to the adoption by the private lines of a safer door. A number of illustrations of car doors accompanied the report.

UNCOUPLING ARRANGEMENTS FOR M. C. B. AUTOMATIC COUPLERS.

Your committee appointed to consider whether a standard uncoupling device is practicable, and the details thereof, would respectfully submit the following report:

The investigation as made was with a view to, if possidle, locating the inner arm of the uncoupling rod so that all couplers could be operated by it, at least those in which the lock is operated by a vertical movement of the lever.

Drawings were received from nearly all of the manufacturers of couplers in use, showing the uncoupling arrangements recommended to be used with each make of coupler. We find that in some of the designs the inner brackets supporting the lever are made of such dimensions and secured in such a way as to be not considered as serviceable as they should, being made very light and secured with lag screws. As a result they are not able to withstand any unusual strain, and in the event of the head of the coupler breaking off, or the coupler becoming detached from the draft rigging, the bracket is torn loose from the car, and the head in the first case, or the entire coupler in the latter, falls upon the track, endangering the train. Your committee believes that this bracket should be made of wrought or malleable iron of generous dimensions, and be secured to the carrier iron bolts or to the end sill or deadwood with bolts not less than three-quarters of an inch in diameter, and that the chain or links used in the connection between the arm of the uncoupling lever and the lock should be not less than five-eighths of an inch in diameter, and the lever should be not less than one inch in diameter.

On the sketches appended is shown the relative location of the center of the arm to the center of the coupler, as recommended by the different coupler manufacturers for their couplers.

From these it will be seen that the center of the arm of the uncoupling rods of four of the couplers shown is located to the left of the center line from two to eight inches, four are located in the center, four are located to the right of the center from one-half an inch to ten inches, one is operated from beneath, one from the side, and two have no dimensions given.

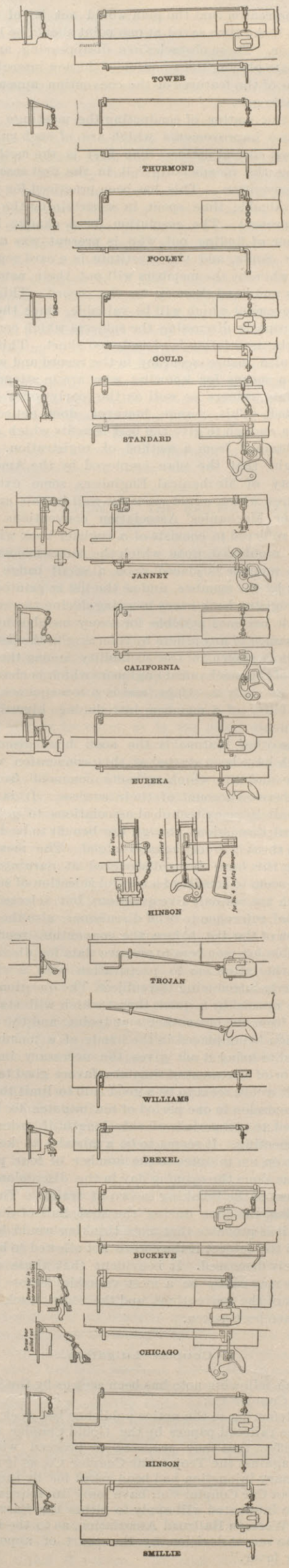
There being so much difference in the location of the inner arm of the uncoupling lever, and in the manner in which the locks of the different couplers are operated, it does not seem practicable to offer a design of lever that would be applicable to all the different couplers or even to all of those which are used in considerable numbers. Your committee can, therefore, only recommend that the levers and the brackets securing same be made of such material and dimensions, and be secured in such a manner, as will insure in the event of the head of the coupler breaking off, or the coupler becoming detached from the draft rigging, the knuckle being unlocked, and the head, in case of its being broken off, being carried by the unlocking arrangement.

METAL UNDERFRAMING FOR FREIGHT CARS.

Your committee on "Metal Underframing for Freight Cars" beg to present the following report:

With the gradual and steady increase in the carrying capacity of freight cars and in the hauling power of freight locomotives, the insufficiency of the earlier methods of freight car construction, developed from wagon building, consisting of timber framing held together by nails, spikes, straps, lag-screws and bolts became more and more apparent.

The lessons learned on the repair tracks led to the strengthening of freight car body bolsters and longitudinal sills with truss rods, and finding this to be still unsufficient, the timbers have been re-enforced with iron and steel, as in the well-known flitch-plate bolster, or in the fairly effective plating of bolsters, end and longitudinal sills, where the metal is disposed to the best advantage and the shrinkage of the timber can be readily followed up, or as at Fig. 4, where the metal is disposed in its weakest position to withstand the main load that a bolster has to carry.



Some designers, recognizing the inherent weakness in any composite form of construction where wood is u went at once to iron for body bolsters, and the iron body bolster was the result, although in its earlier forms it was made too flimsy and was not sufficiently braced to withstand the bending strains, side-bearing pressures, etc. A more recent form of iron bolster is that used by the Northern Pacific Railway, which was illustrated in the RAILWAY REVIEW of May 9, 1896. Here should also be mentioned the Schoen pressed steel bolster, which was illustrated in the RAILWAY REVIEW of April 11, 1896, American and Shickle, Harrison & Howard cast-steel body bolsters, which have been extensively illustrated in the technical journals and are well known to the members.

The plan used by the C. B. & Q. R. R. illustrated in the RAILWAY REVIEW of Feb. 29 of the current volume makes a long step ahead in that the center sills, as well as the bolsters, are of steel. It is very probable that the use of iron and steel in car construction would have advanced far beyond its present standpoint but for prejudice which has grown up in the minds of many against any and all iron or steel cars, as the result of some unfortunate ventures in which the designer either did not fully understand the strains and service a freight car has to withstand, or from lack of experience, and in an endeavor to keep the weight and cost of their cars down to limits, which would enable them to make sales, placed cars in service that have become a by-word on account of their frequent and prolonged sojourns on the repair tracks.

It would be quite as unjust to condemn all iron or steel car construction on account of these failures as it would be to condemn the use of wood in car construction because some of the earlier builds of cars, and even some comparatively recent designs, are so poorly proportioned that they are constantly failing. The obviously proper course is to profit by these early failures in iron car construction, make use of the experience gained and go on with the development of the steel car frame, trying to avoid the errors of the past. It is only necessary to remind those present of some of the exhibits at the Chicago exposition to show that progress has been made in the right direction.

It would be eminently desirable if the M. C. B. standards could be issued in advance for the guidance of railroad companies instead of being adopted after the need for such standards has led to the use of a multiplicity of designs, which add to the expense and delay in car repairs. Car building is anything but an exact science, and the evolution of a standard design for an iron or steel car frame must come after many experiments, errors and failures, profiting by which experience we will ultimately achieve success.

Even if the members of your committee felt that they could present a design for standard steel framing for freight cars which would be practically perfect and require no future modification (which is not the case), it would not be practicable to do so until greater uniformity in the lengths and sizes of interchange freight cars for given capacities has been brought about. It is hoped that a thorough inquiry into the subject will be made by the association by means of a committee to recommend standard lengths of sills and widths over sills for refrigerator, box, stock, flat, drop bottom and drop end gondola cars of 60,000, 70,000 and 80,000 lbs. capacity, and that the association will adopt such standards.

After this step has been taken, then with sufficient experience and knowledge to guide them a committee could take up the subject of steel underframing for freight cars, and with good hope of success, present to the association a series of designs for M. C. B. steel underframes that could be adopted and used as far as their general features are concerned without fear of serious failure ensuing.

As long as the main framing for foreign freight cars coming on our repair tracks is of timber (which can be cut and dressed to suit by the ordinary carpenters' tools), and of iron truss rods and bolts (which can be cut or welded by any blacksmith), odd sizes of sills, etc., are not such a serious matter, but when we come to steel and iron, which require heavy machine tools and shop treatment, and where odd sizes or shapes must be specially ordered and rolled or forged at the forges or mills, the question of uniformity of sizes becomes one of paramount importance.

With standard lengths, depth, width of flange and weight per foot for sills of all flat bottomed cars of 60,000, 70,000 and 80,000 lbs. capacity, the rolling mills can carry the stock ready for instant shipment, feeling safe that they will not have it left on their hands as obsolete stock; the sills and shapes in stock at any railroad shop store would be certain to suit any foreign car that might come on the repair tracks, only requiring that the holes, etc., should be laid off and punched or drilled to suit the details of the particular car, but before this happy state of things can be brought about, the standards for lengths and widths of cars must be adopted, and — when steel framed cars are built—rigidly adhered to.

Pending the adoption by the association of the standard lengths and widths for given capacities, your committee presents the following rules or recommendations which they feel justified in asserting should be seriously considered by designers of steel framing for freight cars:

1. Especially forged, pressed or rolled shapes, cast steel, etc., or patented forms of construction are undesirable for cars to be used in general interchange business, no matter how well designed theoretically, for the reason that when such parts are damaged there must necessarily be long delays in ordering and obtaining these special parts, and should the parties who have furnished them go out of business or change their molds or patterns, the parts cannot be duplicated for repairs except at enormous expense and loss of time.

2. Steel and iron bars and shapes of standard bridge

specifications and regular market sizes should be generally preferred, so that railroads and car builders can avail themselves of the competition in the open market when purchasing, or if not equipped to put steel frames together themselves, can have this work done for them at any of the numerous bridge-building concerns on competitive bids, the underframes, bolted or riveted together, can be shipped by car load lots to the car shops to be completed into finished cars.

3. Get-at-ableness in the design is of the greatest importance in keeping down the first cost and maintenance; parts that are to be riveted together should be so arranged that they will be equally convenient for hydraulic or power riveting when the car is being built, or for field riveting in repair work.

4. In designing riveted work it should be laid off with plenty of rivets,these to be spaced close, as in boiler work, and the same care to insure true, fair holes, hot rivets well driven and completely filling the holes, as in first class boiler work, is necessary. Complaints sometimes heard against riveted work in car frames and tender frames on account of loose rivets can be directly traced to an insufficient number of rivets and poor riveting.

5. If bolts are used to hold iron or steel parts in position, not merely to carry weight, they must be turned bolts (a driving fit), in carefully reamed holes, fitted with the greatest care. When so fitted they will probably give no trouble from working loose, but as this is machine shop work, such bolts should be avoided as far as possible, as it is not likely that such bolts will be fitted in this way on the repair tracks, while it is reasonable to expect that a hot rivet well driven can be put in anywhere with the aid of a portable forge. In both riveted and bolted work it is of the utmost importance to perfectly fill the holes, remembering that it is the "initial wiggle", if only 1-1000 part of an inch, that will surely produce loose rivets and bolts and oblong holes; no amount of hammering on the heads of rivets, or tightening up nuts or bolts, or the use of lock nuts, nut locks, or fibrous washers will be of any use if the holes are not perfectly filled.

6. Every structure has a foundation, every machine has a bed plate, every animal, bird, fish, and most of the higher works of nature, have a backbone or spine on or around which the structure is framed; this cardinal principle of design seems to have been largely overlooked in freight car construction, and it is believed that the center sills of a freight car should be made its main strength and reliance, and that the entire load shall be carried from the platform, the upper works being simply arranged as a housing to confine and protect the load.

7. To enable the center sills to withstand collision and severe shocks to the best advantage, these sills should be spaced so that they will be directly in line with the dead blocks and thus take the buffing and collision shocks in direct compression. Also their depth should be such that at least the center line of draft and centers of the dead blocks will be within the vertical dimensions of the sills. When so arranged there will be no tendency from shocks or pulling strains to bend the center sills, either laterally or vertically, or to bend or break the end sills.

8. That care should be taken to avoid punching or drilling holes in the flanges of channels or I-beams where these are subject to heavy strains, especially tension or bending strains, unless additional material is added to compensate for this.

9. That with the change from wood to steel the necessity for truss rods no longer exists for cars of reasonable lengths, but that ample and sufficient strength can be obtained within reasonable limits of weight without the use of truss rods and consequent need of adjustment.

10. On account of the sweating and rusting of iron and steel, wood is preferable to iron or steel for flooring, siding and lining of merchandise and stock cars. Much has been said and written on the subject of corrosion of iron and steel brake beams, bolts, pipes, rails, etc., from the action of sulphuric acid leachings from coal cars and salt water drippings from refrigerator cars and manure drippings from stock cars.

There is no doubt that there is serious corrosion from these and other causes under certain conditions, but evidence exists that steel framing under tender and iron work under coal cars in constant service, and steel framing of cars exposed to very damp and destructive climatic influences for many years, have not suffered materially from these causes. Doubtless preservative paints can be found that if properly used when the steel frames are first built and with occasional repaintings will sufficiently protect the steel from corrosion, but as this is a very important subject your committee would recommend that it be made a special subject for committee investigation by a series of tests ranging over nine or ten months' time.

There is an economical side to this question which your committee desires to call attention to before closing their report, namely, now much additional weight and how much additional first cost dare be put on a car without ultimate loss.

1. As regards the question of increased light weight of freight cars of given capacities having steel underframes, your committee feel that they need only state that it is proven to be quite practicable to build cars with steel frames of greater strength and capacity with less light weight than when wooden or composite underframing is used, and that with more experience in the right methods of construction and a proper appreciation of the capabilities and best uses of steel the proportion of carrying capacity to light weight can be still further increased for large capacity cars without danger of increasing the subsequent running repair account.

2. With regard to the question of probable increased first cost of freight cars having steel underframing, the burning question here is: "Will it pay?" There are so many factors governed by local conditions which must enter into the calculation, that each company must perforce figure this out for its own set of conditions.

One factor, namely, the repair account, should,however, here receive passing notice. From the best information obtainable your committee believes that it is very nearly correct in stating that the charge for wheels axles, springs, paint, chain, brake shoes, brasses, couplers and other parts that will wear out and fail as much under the most perfect steel framed car as under the poorest designed wooden framed car in same service will constitute about 50½ per cent of the average total cost of freight car repairs, exclusive of inspection, oiling and packing. Then the two questions remain:

1. Of the remaining 49½ per cent, how much can probably be saved by the use of a perfect steel underframing which would require no repairs except painting during the life of the car?

2. Will this saving, added to the increased freight earnings to the car and to the increased mileage earnings when away from home (due to a less number of days per annum spent on the repair track), pay the interest and depreciation on the extra first cost of the steel car?

Taking the figures given in Poor's Manual, the freight earnings per revenue car for 1894 were about $1.38 cents per day, and the average mileage earnings of cars away from home are only about 15 cents per day.

Where the freight car repair work is being kept up currently the number of cars on the repair tracks can be kept down to 4 per cent of the total equipment; this means that each freight car would spend about 14½ days on the repair tracks each year. If we assume that only 40 per cent of this could be avoided by the use of perfect steel framing, we can possibly save about six days on the repair tracks per annum.

This would mean, if the freights were available, increased freight earnings of $8.28 per annum per car or 90 cents additional mileage earned per annum per car away from home.

It is about right to assume, including private cars, that 30 per cent of all freight cars are constantly away from home.

Taking one lot of 1,000 cars we can assume that as above the freight earnings could be increased	$8,280	per an.
The mileage earned from foreign roads increased	$300	"
	$8,580	"
Estimated possible saving in repairs, say 20 per cent of $72 per car per annum	$14,200	"
	$22,980	"

As the steel framing when put up in lots by bridge builders ought not to increase the cost of cars more than $75 per car at most, this figure of $22,980 per thousand cars for savings and increased earnings would approximate 36 per cent per annum on the extra capital invested, amply sufficient to cover the depreciation and interest charges under the conditions above assumed.

In conclusion, your committee begs to present the following list of drawings of designs for metal underframing for freight cars for the consideration of the members, and begs that members will criticise these designs, using the ten rules or recommendations previously given as the basis for such criticism:

Norfolk & Southern, steel flat car of 30 tons capacity.

Norfolk & Western steel frame coal hopper car 30 tons capacity.

Proposed N. & W. steel frame, 30,000 lbs. capacity.

Design for 36 ft., 60,000 lb. box, stock or flat car framing submitted by R. P. C. Sanderson and C. C. Wentworth.

Trapp's 80,000 lb. steel hopper car.

The Pennock steel car framing.

Steel car framing, submitted by Mr. John Player, a member of the committee.

Carnegie Steel Co., steel hopper, 100,000 lbs. capacity; light weight, 39,000 lbs

At the time of closing this report it is learned that the Illinois Steel Co. is at work on designs for steel cars,drawings for which it is hoped will be received in time to present to the convention. It is also expected that a Norfolk Southern steel flat. Norfolk & Western steel flat and steel framed hopper, Pennock steel car, Carnegie and Illinois Steel Cos.' cars will be completed and on exhibition at Saratoga for inspection by the members.

Owing to the large number of clerks of the Pennsylvania R.R. in Philadelphia who ride to the office on their bicycles, the company has set apart one of the arches under the elevated road west of Fifteenth street for the storing of the wheels. The archway is to be fitted up with all the latest appliances, and is to be in charge of a competent machinest.

NOTICES OF PUBLICATIONS.

DISCIPLINE WITHOUT SUSPENSION; a New Method of Dealing with the Operative Force on American Railroads," by George R. Brown, general superintendent of the Fall Brook Railroad railway service improvement. Series No. 1. Standard size, 6x9. Press of Locomotive Engineering, 256 Broadway, New York. Price, 10 cents.

This is an eight page pamphlet reprinted from Locomotive Engineering of January, 1896, containing a description of and argument for Mr. Brown's method of discipline without suspension, and including a number of examples which illustrate the manner in which the system works. The system itself is too well known and understood to require further description here, and many persons interested in improvements of methods of managing men will be glad to avail themselves of the opportunity, if they have not already done so, to procure a statement of the originator of this form of discipline in this convenient form.

VAUCLAIN SYSTEM OF COMPOUND LOCOMOTIVES — Baldwin Locomotive Works, Philadelphia, Pa. Description of method of operation and maintenance of the Vauclain system of compound locomotives. Eighty pages, standard size paper, 1896.

This is a pamphlet in the form of an advance copy of the new publication describing the Vauclain system of compound locomotives. It has been entirely re-written and contains numerous illustrations which have not been previously published. The work, as its indicates, is devoted to the explanation of the system of compound locomotives known as the Vauclain, and the illustrations include sectional drawings of the different elements of the system such as cylinders, valves, and valve passages and throughout are numerous half-tone illustrations of locomotives, built upon this plan, which have been furnished to different roads. The first chapter, after the introduction, is devoted to the cylinders which is followed by a discussion of the matter of repairs and under the headings "Addenda and Method of Combining Cards," the advantages of the compound system are stated, and information is given for the benefit of those who may have occasion to test scuh locomotives. The chapter on combining cards is by Mr. George H. Barrus, the well-known mechanical engineer of Boston. An extensive list is given of the number of roads using this type of locomotive together with the number which have been ordered by each. Following this some statements are given relative to tests which have been made, and the results thereof. These include those made upon the Northern Pacific, the Western New York & Pennsylvania, the Western Maryland, the Norfolk & Western, the Chicago Milwaukee & St. Paul (for the Master Mechanics' Association), the C. N. O. & P. P., the Long Island, the Philadelphia & Reading, the Wellington & Manawatu, the Central Railroad of New Jersey, and the New York, Chicago & St. Louis railroads. These give merely the results in economy in fuel and water, the statement being made that complete details of the reports of these tests may be consulted at the office of the works in Philadelphia. Copies of this pamphlet may be had upon application to the works at Philadelphia.

TECHNICAL MEETINGS.

Annual convention American Master Mechanics' Association, June 22, Saratoga, New York.

Association American Railway Accounting Officers,May 27, New York City.

Association Railway Telegraph Superintendents, June 17, Fortress Monroe, Va.

American Association General Baggage Agents, July 15, Philadelphia, Pa.

The American Society of Civil Engineers holds meetings on the first and third Wednesdays in each month, at 8 p.m., at the House of the Society, 127 East Twenty-third street New York City.

The Association of Civil Engineers of Cornell University meets weekly every Friday, from October to May inclusive, at 2:30 p. m., at Lincoln Hall, New York.

The Boston Society of Civil Engineers, meets monthly on the third Wednesday in each month, at 7:30 p. m., at Wesleyan Hall, 36 Bromfield street, Boston, Mass.

The Canadian Society of Civil Engineers meets every other Thursday at 8 p. m., at 112 Mansfield street, Montreal, P. Q.

The Foundrymen's Association meets monthly on the first Wednesday of each month, at the Manufacturers' Club, Philadelphia, Pa.

The International Irrigation Congress will hold its fourth session at Albuquerque, N. M., September 16-19. Fred L. Alles, secretary, Los Angeles, Cal.; local secretary, W. C. Hadley, E M., Albuquerque, N. M.

The Montana Society of Civil Engineers meets monthly on the third Saturday in each mouth, at 7:30 p. m., at Helena, Mont.

The New England Railroad Club meets on the second Tuesday of each month, at Wesleyan Hall, Bromfield street, Boston, Mass.

The New York Railroad Club has a monthly meeting on the third Thursday in each month, at 8 p. m., at 12 West hirty-first street, New York City.

The Northwestern Track and Bridge Association meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m., at the St. Paul Union Station, St. Paul, Minn.

North-West Railway Club meets alternately at the West Hotel, Minneapolis, and the Ryan House, St. Paul, on the second Tuesday of each month.

The Engineering Association of the South meets on the second Thursday of each month at 8 p. m., at the Cumberland Publishing House, Nashville, Tenn.

Annual meeting Traveling Engineers' Association, Minneapolis, Minn., Sep. 8, 1896. W. O. Thompson, secretary 415 Marion street, Elkhart, Ind.

Annual Convention Roadmasters' Association and Road and Track Supply Association, Cataract Hotel, Niagara Falls, N. Y. second Tuesday in September, 1896.

The Railway Signaling Club holds its meetings in Chicago, Ill., on the second Tuesday of January, March, May, September and November. G. M. Basford, secretary, 818 The Rookery.

The Southwestern Society of Mining Engineers will hold a session at Albuquerque, N. M., September 16-19. Walter C. Hadley, secretary, Albuquerque, N. M.

The Southern & Southwestern Railway Club holds its meetings on the third Thursday of January, April, August and November, at the Kimball House, Atlanta, Ga.

The Western Foundrymen's Association holds its meet ings on the third Wednesday in each month, at the Great Northern Hotel, Chicago, Ill.; secretary, S. T. Johnstone, 1522 Monadnock building.

The Technical Society of the Pacific Coast has a month y meeting on the first Friday in each month at 8 p. m., at the Academy of Sciences building, 819 Market street, San Francisco, Cal.

The Engineers' Club of Cincinnati has a monthly meeting on the third Thursday in each month, at 7:30 p. m. at the Literary Club, 24 West Fourth street, Cincinnati, O. Address P. O. Box 333.

The Engineers' Club of Minneapolis holds its meetings on the first Thursday in each month, at Public Library building, Minneapolis, Minn.

The Engineers' Club of Philadelphia meets on the first and third Saturdays in each month, at 8 p. m., at the house of the club, 1122 Girard street, Philadelphia, Pa.

The Civil Engineers' Club of Cleveland, meets on the second and fourth Tuesdays in each month, at 8 p. m., at the Case Library building, Cleveland, Ohio.

The Association of Engineers of Virginia, holds its in formal meetings on the third Wednesday of each month from September to May inclusive, at 8 p. m., at 710 Terry building, Roanoke, Va.

The American Society of Irrigation Engineers. Third annual meeting will be held at Albuquerque, N. M., September 16-19. John L. Titcomb, secretary, 36 Jacobson block, Denver, Col.

The Western Railway Club of Chicago, holds its meeting on the third Tuesday of each month.

The Central Railway Club meets on the fourth Wednesday of January, March, April, September and October, at 10 a. m., at the Hotel Iroquois, Buffalo, N. Y.

The Denver Society of Civil Engineers meets on the second and fourth Tuesdays in each month except July, August and December, when they are held on the second Tuesday only, at 36 Jacobson building, Denver, Colo.

The Western Society of Engineers holds its regular meetings for the transaction of business and the reading nd discussion of papers on the first Wednesday of each month except January.

PERSONAL.

Mr. W. I. Herbert has been appointed contracting agent of the Baltimore & Ohio and is located at Toledo, Ohio.

Mr. B. C. Hicks, manager of the Consolidated Cattle Car Co., having resigned, that office has been abolished.

Mr. I. J. Travis has been appointed superintendent of maintenance of the Elgin, Joliet & Eastern, with office at Joliet, Ills.

The official circular announcing the appointment of Mr. G. M. Freer, as general agent of the Cleveland, Akron & Columbus, in this city has been issued.

Mr. Edmund Wragge, for 15 years local manager of the Grand Trunk Railway at Toronto, Can., will retire from that position in a few days, General Manager Hays having decided to abolish the position.

It is officially announced that Mr. Archie McLean has been appointed superintendent of motive power and equipment of the Georgia Northern road, vice Mr. Albert Marugg resigned. Mr. McLean's headquarters will be at Pidcock, Ga.

Mr. O. O. Winter, superintendent of the Willmar division of the Great Northern, has resigned. His resignation will take effect July 1. Mr. Winter thereafter will be general manager of the Brainerd & Northern road, a lumber line owned by Minneapolis capitalists.

Mr. J. T. Donovan, an old Illinois Central man, has been made commercial agent of the company, with headquarters at Paducah, and Mr. W. S. Benson, formerly a Chesapeake, Ohio & Southwestern man has been made commercial agent of the same line with headquarters at Du buque.

Announcement is made of the appointment of Mr. Jas. Robertson as general agent of the Great Northern line at Duluth, vice Mr. J. C. Eden, now general freight agent of the Eastern Minnesota. Mr. Robertson was formerly general agent of the Great Northern line at St. Louis.

Mr. M. L. Fillmore, who has for some time been superintendent of the Santa Cruz division of the Southern Pacific, has resigned, and this territory will be consolidated with the Coast division under Superintendent Fraser. A farewell banquet was tendered Mr. Fillmore in Oakland by the employes of the division.

Mr. J. E. Butler has been appointed commercial agent for the Ann Arbor, with headquarters at Detroit. Mr. Butler was for ten or twelve years connected with the Michigan Central and is thoroughly acquainted with Detroit and surrounding territory. He is now connected with the Great Northern, which line, it is said, he will work in connection with the Ann Arbor.

Mr. Herbert Sheridan has been named as traveling freight agent of the Baltimore & Ohio, with headquarters at Sandusky. Mr. Sheridan, although he has more recently been engaged in the life insurance business, is a railroad man of an extended experience. He will be directly under the jurisdiction of Division Freight Agent C. T. Wright.

Mr. G. R. Tuska, has been appointed chief engineer of the Panama Railway Co. Mr. Tuska, who has the title of Assoc. M. Am. Soc. C. E., has for some time been instructor in civil engineering at Columbia College and has, besides, been doing consulting engineering work in private practice. He will resign his position at Columbia, but will continue his private practice.

Mr. Samuel B. Sweet, now assistant general freight agent of the Lake Erie & Western, with headquarters at Indianapolis, has been appointed general freight agent of all the Brice lines except the Cleveland, Akron & Columbus. Two assistant general freight agents have also been appointed and they are Mr. A. G. Young, division freight agent of the Ft. Wayne division, and General Agent H. J. Graham at Peoria.

Mr. Abram G. Amsden, superintendent of the Kalama zoo division of the Lake Shore road, died at his home in Grand Rapids on June 10, after a long illness. Mr. Amsden entered railway service in 1871 with the Lake Shore, with which road he had been associated continuously until his death. For nearly ten years Mr. Amsden was located in Chicago, holding the office of superintendent of the western division of the Lake Shore, leaving this position in 1892 to accept the position held by him on the Kalamazoo division.

Mr. G. W. Fletcher, who has held the position of commercial agent of the Southern Pacific, has been made general agent, with the general duties of looking out for both passenger and freight traffic and soliciting business. Mr. Fletcher will report to General Freight Agent Smurr and General Passenger Agent Goodman, and will have his office at 613 Market street, San Francisco, under the Grand hotel. The position of commercial agent will be filled by Mr. Griffin, at present a ticket clerk.

Mr. E. T. Affleck, division freight agent of the Baltimore & Ohio, is to be promoted to the position of western coal and coke agent with headquarters in Columbus, O. It is understood Mr. Affleck will have charge of all coal and coke originating in Ohio or passing through this state to Chicago and other northwestern markets. It is also said that Mr. J. S. Fairchild, at present local freight agent, is to succeed Mr. Affleck as division freight agent Mr. Fairchild's territory will extend over the Central Ohio and Midland divisions.

RAILWAY NEWS.

Atlanta, Knoxville & Northern.—This road, which has just obtained a charter from the secretary of state of Georgia, will be formed of the reorganized Marietta & North Georgia and an extension of its tracks from Marietta to Atlanta, thus making a through line to Knoxville. If present plans are carried out the new line when completed will decrease the present distance between Atlanta and Knoxville by 25 miles. The principal owner of this road is stated to be H. K. McHarg of New York and Thos. Carmichael of London is also a large stockholder.

Central Pacific.—Arrangements have been made by the Central Pacific R. Co. to extend its $3,383,000 first mortgage bonds, maturing July 1 next, so that the principal shall become payable in 1½ years, with interest meanwhile payable semi-annually at the rate of 5 per cent, the right being reserved to redeem the bonds at any time on paying the face value and interest at 6 per cent. The right of the bondholders to avail themselves of such extension has been reserved to such holders as prior to June 20 shall deposit their bonds for that purpose with Speyer & Co., New York; Speyer Bros., London; Laz. Speyer & Ellison, Frankfort-on-Main; Teizera de Mattes Bros., Amsterdam.

Chicago, Weatherford & Brazos Valley.—The company promoting this line has been incorporated and is formed for the purpose of constructing, owning and operating a road, to begin at Weatherford, in Parker county, and running thence in a northerly direction through Parker and Wise counties to intersect the Rock Island at Bridgeport, in Wise county, Texas, a distance of thirty miles, and from Weatherford south to Waco. It is generally believed that the Rock Island road is behind the movement as it is thought it would look with much favor upon the idea of getting into central Texas. It is stated that the northern portion has been completed to a point within eight miles of Bridgeport. Henry Warren is president, and F. Peters is chief engineer.

Cincinnati, New Orleans & Texas Pacific.—The trustees for the sinking fund of Cincinnati have accepted a bid of $19,000,000 for the sale of the Cincinnati Southern Railway, the bidders being Messrs. A. B. Andrews, second vice president of the Southern Railway, and H. A. Taylor of the Cincinnati, Hamilton & Dayton Railway. They agree to pay the present rental of $240,000 a year until 1902, after which date they agree to pay the city 10 per cent on gross earnings of the road in excess of $4,500,500 a year until 1996, when they can purchase the road outright for $19,000,000 in gold.

Frederic & Pennsylvania.—This road, 28 miles in length was recently purchased by the Pennsylvania R. Co., through its secretary, Mr. John C. Sims, for $150,000. The line was built in 1868, and runs from Frederic, Md., to Kingsdale, Pa., but after two years unsuccessful operation it was leased to the Pennsylvania Co., which now makes the purchase. It is rumored that an extension will be built to Washington, D. C.

Kansas City, Pittsburgh & Gulf.—All the work on the Kansas City, Pittsburgh & Gulf south of Shreveport to Beaumont is now under contract, a distance of 140 miles. It is understood that as soon as grading is completed on this section tracklaying will begin immediately with a view to completing the entire system from Kansas City to the Gulf of Mexico by Jan. 1, 1897. It is said there has been already a very great development along the route of the roads. In the lumber regions the mills have gone into the woods and have piled up many thousands of feet of lumber in advance of the building of the road. In the mining regions of Arkansas, numerous mines have been started in view of the building of the road, mining lead and zinc, including manganese, which are found in Arkansas. Negotiations are in progess, it is understood, between representatives of the road and the business men of Hot Springs, Ark., with a view of building a branch of this system from the main line to Hot Springs, a distance of about 65 miles.

Lake Street Elevated.—It now seems to be settled that the Lake Street Elevated road will extend its western terminus one mile to the west line of Austin, giving it seven miles of double tracks. It has a bid of $230,000 for its construction. The company has $150,000 in the treasury and will borrow the $80,000 necessary to pay for the extension. It received $441,000 for its extension of five blocks from Fifth avenue to Wabash avenue from the Union Loop Co. The electrical equipment which is now in use cost $300,000.

Northeastern of Georgia.—Messrs. E. A Richards & Co., to whom the Northeastern R. of Georgia has been leased and who took possession of the property June 1, have, it is said, confirmed the statement that the line will be extended to Chattanooga, Tenn. It is claimed that financial arrangements have practically been completed, and that surveyors are to be placed in the field at once, to be followed by the beginning of construction work as soon as the line is laid out. The present line extends from Athens to Lula, a distance of about 39 miles, but the proposed extension will make a total length of 120 miles, with Athens, on the Seaboard Air Line, and Chattanooga, the terminal points. W. S. Witham of Atlanta, Ga., is treasurer and Martin Dooley, superintendent.

Oregon Improvement Co.—It is said that the reorganization committee of the Oregon Improvement Co. has determined to put the company on a thoroughly solid basis. The property owned by the company is quite extensive and comprises nine steamships, now operated by the Pacific Coast Steamship Co., 5,130 acres of coal lands, 5,419 acres of agricultural land and town lots, grain warehouses, coal docks and much other miscellaneous property on the Pacific coast. The Pacific Coast Steamship Co. owns twelve steamships as well as much other property, material and supplies in San Francisco and elsewhere. The railway company owns a narrow gage railway of 77 miles in Southern California. The Seattle & Northern R. Co. owns 36 miles of standard gage line, which connects with the Canadian Pacific system. The Port Townsend Southern R. Co. owns 43 miles of standard gage line. The Columbia & Puget Sound R. Co. owns 54 miles of narrow gage line, together with other valuable property. The Terminal properties of these companies are considered highly valuable because of their relation with the Northern Pacific.

Philadelphia, Bustleton & Trenton.—This new road which is a branch of the Pennsylvania, has been graded from its junction with the New York division, a short distance east of North Penn Junction, to the Oxford turnpike, its present terminus, and tracklaying which is already begun is expected to be finished in a few months. There are bridges to be erected over the Tacony, Frankford and Wingohocking creeks, and a number of streets will require overhead crossings. Five streets will be carried over the railroad.

San Francisco & San Joaquin Valley.—The directors of this company who hold in trust for ten years the 24,450 shares of stock of the company, met this week at the request of the Directors to approve the proposition the to authorize the issue of $5,000,000 of bonds for extensions. This being is done the bonds will be sold, as money is needed. It is thought $3,500,000 will be required to make the extension of 165 miles from Fresno to Bakersfield. The remainder will be used in building the extension from Stockton to Oakland. The directors think it best to build south of Fresno before undertaking the Oakland branch. Difficulties over rights of way south of Fresno may make them change their minds.

According to Engineer W. B. Storey's report on the progress of building the Valley road the track is now laid between Stockton and the Merced river, 55 miles. South of Merced as far as the San Joaquin river grading is going on at seven different points. All told, some 200 teams and 400 men are employed. The bridge over the San Joaquin river is in process of construction. Between the river and the town of Fresno, a distance of twelve miles, the contracts for grading will not be let for several weeks yet. The contractors already holding contracts are Grant Bros., San Francisco; J. D. McDougald, Stockton; Colton Bros., Oakland, and the San Francisco Bridge Co., of San Francisco.

Southern Pacific.—It has been announced by officials of the Southern Pacific Co. that the company will shortly make Galveston the port for its Atlantic steumship line, instead of New Orleans. As soon as the Charleston harbor shall have been dredged to the proper depth the Morgan Line of steamers will carry transcontinental freight to that port, thus reducing the rail haul by 311 miles, and giving the Sunset route a greater competing advantage. It is said that the Southern Pacific will extend its line from Houston to Galveston, instead of using the Gulf, Colorado & Santa Fe between those places, as it does at present.

Tracklaying north of the Santa Ynez river on the Coast division has been completed and work commenced on the big bridge across the stream mentioned. A station will established on the south side of the river, which will be

made the junction for the branch to be built to Lompoc. When the Santa Ynez river is crossed the intervening distance to Elwood will be reduced to 60 miles. The consolidation of the Coast & Santa Cruz divisions of the Southern Pacific Co., under the superintendency of Mr. J. A. Frazier, went into effect June 1. It is rumored that the company will extend a branch road to Cayucos in order to secure the trade of that section of the country. It would be an inexpensive road to build, a boon to the people along the coast and certainly ought to be a profitable feeder for the road.

Trinity, Cameron & Western.—On June 10 the Texas railroad commission granted the Trinity, Cameron & Western R. authority to issue $2,847,453.03 of bonds on 145 miles of road between Georgetown and Trinity. This authority consolidates two former orders, for the issue of bonds, one for the Georgetown & Granger and the other for the Trinity, Cameron & Western. The present management, having adopted the latter name wished to have the bonds issued under that name. It is said that this road contemplates building to Austin via McNeil from Georgetown.

NEW ROADS AND PROJECTS.

Alabama.—The Montgomery, Hayneville & Camden road has been surveyed and located between Montgomery and Camden, a distance of 75 miles, of which 11 miles are now graded. The financial plan is to issue bonds at the rate of $12,500 per mile, which will be sold upon the completion of each five miles of the road. It is claimed the company already has $50,000 in stock subscriptions to be paid in cash when the road is completed. The route of the proposed road is through Wilcox, Lowndes, Dallas, Montgomery, Monroe and Butler counties, having a total population of over 200,000 inhabitants and an estimated valuation of property of about $40,000,000. In addition to cotton, the usual staple southern crops are raised in abundance, while a large territory is available for stock raising. It is claimed that beds of marl, valuable for fertilizers, are also adjacent to the route, as well as hardwood of various kinds and pine timber. The Mercantile Trust & Deposit Co. of Baltimore has consented to act as trustee, and the promotors state that they will place none of the bonds until they have carried out the plans mentioned in the prospectus which has been issued, describing the advantages and resources of the route which it has surveyed for its line, and describing the possibilities of such a road being placed upon an independent financial basis by its individual earning power.

Florida.—At a meeting of the directors of the Florida, Peninsular & Gulf, held in Boston on June 2, officers were elected as follows: Chas. H. Foster, Manatee, Fla., president; Woodward Emery, Boston, vice president; Chas. A. Rogers, Boston, treasurer; A. H. Rogers, secretary; Geo. B. Morton, Baltimore, Md., general manager and chief engineer. This road, if completed as projected, will run from Plant City, in Hillsboro county, to Boco Grande, in De Soto county, via Manatee, and will be a great help to the phosphate mines and vegetable growers of Manatee and vicinity.

Maine.—The contract for a 15-mile extension of the Sebasticook & Moosehead Lake R. has been let to Mr. William T. Davis, of Boston, who expects to have, within two weeks, between 200 and 300 men at work. Mr. Davis will use 30,000 railroad ties and much other material in the work which will be furnished by parties in that section. Mr. Z. D. Lancaster, of Hartland, Me., is superintendent of the road.

Minnesota.—What will be known as the Fosston branch of the Great Northern road is about decided upon according to reports from that vicinity. A corps of surveyors under Engineer Till of the Great Northern have begun running a permanent line from Fosston to Duluth crossing the Mississippi river at Bemidji and forming a connection with the Duluth & Winnipeg at Deer river on the boundary line between Itasca and Cass counties. Surveyors have also been running lines through the western part of Polk and Norman counties with the result, so it is said, that the Halsted branch will be extended to Crookstown at once. The western townships north of the Red Lake river have been surveyed for the rails, which will extend to a point on the Minnesota side opposite Drayton, N. D. These two lines would provide transportation facilities for a large section of country which is at present unprovided for. Work on the Fosston branch will begin it is claimed, this year, but it is not the expectation of the company to attempt to complete the line until next year. The prospects of the Hines road have, it is thought done much to hasten the move which is being made in railroad matters in this portion of the valley just now.

Pennsylvania.—Bids are under consideration for the construction of an extension to the Cambria & Clearfield division of the Pennsylvania R. from Cherry Tree northward and down the susquehanna river to Burnside, a distance of nine miles. The new road, which will be used principally for the transportation of coal, will be known as the Cherry Tree branch of the Cambria & Clearfield.

Texas.—The surveying corps which was sent out by Mr. Charles Hamilton, vice president and general manager of the Texas Central, in the interest of that road to survey a line from Albany, the present northwestern terminus, to some point near the border of New Mexico, has completed that work. The first 35 miles of the survey took over a month, as Albany is situated near a line of foothills and some sharp grading was necessary. After passing California creek the work was easy, and from that point westward the grades will be light for the work of construction. The object in the extension of the Texas Central is to open up the vast region between the Fort Worth & Denver City and the Texas & Pacific. This portion of Texas between the two railways named is wholly without railway facilities. Engineer Gould's party found primitive conditions prevalent, oxen used for long distance freighting and stage coaches lumbering across districts hundreds of miles in extent. General Manager Hamilton is said to be pleased with the result of the survey, but is not able to say when construction will begin.

EXHIBITS AT THE CONVENTIONS.

The exhibits at the Master Car Builders' and Master Mechanics' conventions in session at Saratoga are this year greater in number, more extensive and of greater variety than ever before. The rapid increase of the use of air about railway shops, and the use of metal in car construction has naturally called forth elaborate exhibits in both these lines and those who supposed that the coupler field had been exhausted found they were laboring under a decidedly false supposition.

Before anything is said about the exhibits something ought to be said about the great amount of labor done for others by James H. Sewall. Mr. Sewall has laid aside his own business for the last two weeks and has spent his time here out of sheer good will and hoping for no reward, working to get everything ready. The court yard in the rear of Congress Hall is a veritable machine shop, and that it is so is due wholly to the active supervision of Mr. Sewall. A locomotive boiler, loaned by the Delaware & Hudson people, is in place, with a line of steam pipes leading to various steam engines, air compressors, and other steam devices, while air pipes go everywhere so that air machinery can be operated. Mr. Sewall set the lines of shafting, helped along the heavy work, and without his natural mechanical knowledge this part of the convention would have made a poor showing.

Among the exhibits we notice the following:

The Hancock Inspirator Co. of Boston is represented by Mr. Chas. W. S. McGowan, general Sales Agent; Chas. E. Randall and Thomas Aldcorn. They have a fine showing of locomotive inspirators of four models, also a 7 B type which is the sole feeder of the locomotive boiler in the court yard. These inspirators are interchangeable with any and all standard injectors in use and also with the old patterns of locomotive inspirators. A decided feature of their exhibit is their patent hose strainer to keep grit and dirt out of locomotive boilers. This has attracted much attention. They also show special main steam valves and boiler check valves.

The General Electric Company of Schenectady, N. Y., had a large photograph of their Baltimore & Ohio electric locomotive, and much literature. They had a strong battery of representatives, consisting of W. J. Clark, general manager railway department; L. H. Parker, first assistant manager railway department; Charles C. Pearce of their railway department; W. B. Potter, chief engineer; F. H. Shepard, Boston agent.

The Ross Valve Company of Troy, N. Y., displayed an assortment of reducing and regulating valves of various sizes, and was represented by Mr. Wm. Ross.

The Boston Woven Hose Company of Boston, showed air brake and other hose, and various rubber devices.

The Bundy Mfg. Company of Binghamton, N. Y., the Bundy time clock. Mr. H. E. Bundy was present.

The Safety Heating and Lighting Company of NewYork had a handsome display of the well known Pintsch light, consisting of a portal supported by composite columns done in white, suspended from the top of which were two of their special inverted burner lamps, two of their standard four-flame lamps and one vestibule lamp. The back of this exhibit was made of a French plate glass mirror. These lamps were kept lighted with Pintsch compressed oil gas and the exhibit was so arranged that city gas could be turned on to show the difference in illuminating power. If some of the railroad men here would study this exhibit more closely they would protest when they get home against their roads using any more city gas to light their cars with, even as the traveling public has long protested. Col. Robert Andrews, vice president, was in command, ably assisted by Messrs. O. C. Gayley, E. F. Slocum and Wm. B. Stevens.

The Smart Flush Car Door Company of Nashua, N. H., showed a fine flush rain and burglar proof car door with Mr. H. D. Smart in charge.

The Peerless Rubber Mfg. Company of New York was represented by Mr. Chas. H. Dale, president; W. J. Courtney, manager railroad department, and C. S. Prosser, contracting agent. This company had its usual elaborate display of rubber air brake hose, belting, packing, gaskets mats, washers, etc., and the engine that drove the machinery here drove it by means of one of their famous "Rainbow" belts.

The Brussels Tapestry Company of Chauncy, N. Y., displayed their car window shades in charge of Mr. W. S. Calhoun.

Mr. Henry L. Leach of Cambridge, Mass., had a good display of his special sand feeding pneumatic machines. There was a full size locomotive and sand device in operation, and several of his instruction sand domes now so popular with railroads.

The Consolidated Car Heating Company, of Albany, N. Y., had a nice exhibit of their new Pope system of car lighting, consisting of five four-burner standard car lamps of different styles, burning Pope compressed oil gas. These were pendant from an oak ceiling supported by columns and behind it was a plate glass mirror to highten the effect. It was in charge of Messrs. R. P. Scales, W. N. Stevens and W. P. Casper.

The Boston Belting Co., of Boston, had a large exhibit of rubber air brake hose, crude and partly manufactured rubber, packing, gaskets, and many other mechanical rubber goods. It was in charge of Mr. George Bennett Forsythe, T. R. Freeman, John F. Muldoon and F. T. Alden.

Mr. A. D. Barnett represented the Eureka Nutlock Co., of Pittsburgh, with a display of their goods.

Mr. A. O. Norton, of Boston, represented by his son Harry, showed the well known Norton ball bearing jack in assorted sizes. The locomotive boiler in the yard also rested upon three large Norton jacks.

The Revere Rubber Co., of Boston, made their first display of an assortment of mechanical rubber goods.

The Evans Artificial Leather Co., of Boston, had two car seats and other goods covered by their new unscratchable substitute for leather, called "morrocoline." Mr. W. N. Dole, general manager, and Albert E. Prince were in charge.

The New York Belting and Packing Co., of New York, made their first display of air brake hose and various mechanical rubber goods.

Wilson & McIlwain, of Pittsburgh, Pa., dealers in railway supplies, exhibited the McIlwain improved handle for quarter-way cocks, steel air brake fittings, &c. Mr. J. D. McIlwain was there welcoming his many railroad friends.

The A. French Spring Co., of Pittsburgh, showed their eliptical and spiral springs and the Morris pressed steel box lid. Mr. George Morris, D. C. Noble and L. C. Noble were present. Mr. D. C. Noble thinks that the fishing, or rather the catch, will improve in quality when done on a republican gold platform.

The New York Rubber Co., of New York, made their first exhibit of general rubber goods.

The E. T. Burrowes Co., of Portland, Me., under the management of Mr. H. H. Russell, had a handsome display of their car window shades, including the well-known Pinch handle shade and their new and popular cable curtain. They also had two handsome mahogany frames showing different styles and types of both patterns of curtains. There was also a large picture of their enormous factory at Portland.

The Lewis Tool Vise Co., of New York, displayed an assortment of vises.

Mr. J. C. Pearson, of Boston, showed cement coated nails for car building.

Wm. C. Baker, of New York, had two of his famous fire proof car-heaters for railroad men to see. Mr. Baker, as young as ever in his feeling, was shaking every bodys' hands.

The Westinghouse Machine Co., of Pittsburgh, ran all of the machinery with one of their automatic engines.

The E. S. Greeley Co., of New York, showed the Acme journal and packing waste.

The Standard Car Coupler Co., of New York, was represented by its two popular officers: C. A. Post, president, and A. P. Dennis, secretary.

The C. H. Haeseler Co., of Philadelphia, had a display of pneumatic specialties for drilling, reaming, and tapping. The Keller pneumatic tools, air hoists, etc. Mr. C. H. Haesoler, president, was in charge.

The Pedrick & Ayer Co., of Philadelphia, showed an air compressor.

The Schoen Pressed Steel Co., of Pittsburgh, exhibited their new and handsome pressed steel car truck frame which attracted much attention, as did also their pressed steel car bolsters. Mr. Chas. T. Schoen and E. T. Schoen were present.

The Trojan Car Coupler Co., of Troy, N. Y., had a Trojan coupler mounted on wheels on exhibition. Mr. Alfred Renshaw, general manager; Mr. W. C. De Armond, eastern, and Mr. H. W. Loomis, western agents, were on hand.

L. C. Chase & Co., of Boston, were represented by Mr. Robert R. Bishop, and their usual line of assorted car plushes.

A unique feature was a half dozen bicycles suspended in a cross section of a baggage car on special hooks, on which there are no patents. It was a labor of love, done under the direction of Mr. Sterling Elliott, president of the American Wheelmen's Association, for the instruction of baggage men, to make wheel carrying on railroad trains easier. Mr. Elliott was present.

Prof. Allen of the Massachusetts Institute of Technology found much instruction and entertainment in attending the conventions.

The Standard Steel Works of Philadelphia had a handsome exhibit under the charge of Mr. Merle Middleton, Mr. Charles Riddell and Mr. G. L. Courteny, Jr. It consisted of a wrought iron wheel center, spoke and plate steel tired wheels for locomotives and cars. Also sections showing method of manufacturing wrought iron centers, and section showing improved methods of manufacutring locomotive tires.

The National Car Wheel Co. of Buffalo, N. Y., showed six different styles of steel tired wheels turned out by its works.

The Q. & C. Co. of Chicago has a very neat exhibit of a nickel-plated model of the McKee brake slack adjuster, showing the manner of its action and also one of the adjusters full size, ready for application. They also have models of the Hoyt flush car door and the Williams valve setting device. The company is represented by Messrs. C. F. Quincy, E. W. Hodgkins, F. G. Ely, F. E. Crane, F.W. Edmunds and J. K. Lencke.

The National Machinery Co., of Tiffin, Ohio, is represented by Mr. Frank Bloom, manager of the company, who had in his exhibit some very nice photographs of the line of machinery built by that company. These are bolt headers, bending machines, rivet and spike making machines, car link machines, shears and a large line of screw cutting and nut tapping machinery of various designs and dimensions.

The Chicago Railway Equipment Co. has exhibited some of the national hollow brake beams and also some brake shoes which have been worn out on beams equipped with the self-adjusting brake head made by that company. These shoes are worn in a remarkably even manner and are an excellent object lesson. The company is represented by Messrs. H. J. Farley, E. B. Leigh, L. C. Burgess, B. F. Wilson and F. G. Ely.

Mr. Philip Hein represents the Railroad Supply Co. and employs his time in explaining the good points of the Hein double automatic car coupler, which has been fully illustrated and described in these columns. The company also has on exhibition one of its oil box car jacks.

The Ingersoll-Sergeant Co., has one of the best exhibits at the convention and is the only company exhibiting air compressors. There are two machines from this company in operation, one of them being a triplex compressor having a steam cylinder 7 x 9 in. and air cylinders 7¼ in. and 12¼ x 9 in. This machine runs at 150 revolutions per minute, delivers air at 75 lbs pressure with 90 lbs. of steam and furnishes 175 ft. of free air per minute. It is charging two reservoirs which supply the air for the extensive exhibit of the Chicago Pneumatic Tool Co. The second compressor is a belted machine having a cylinder 8 x 8 in. and is used for supplying air for operating a number of small devices exhibited by various firms. The company is represented by C. W. Shields, who is assisted by an efficient corps of engineers in handling the compressors.

Mr. J. T. Wilson, of the American Balance Valve Co., has a complete and interesting line of the valves which that company have been so successful in introducing. Among these are valves made for the Pennsylvania Railway, the Wisconsin Central, the Illinois Central, the Southern Pacific and the Chicago & Northwestern Railways. Two valves which were used in making tests at Purdue University are also on exhibition as well as a large assortment of rings, gages, etc.

The Gifford coupler, as manufactured by Gilchrist & Co., was shown in a coupler mounted and is in actual operation.

Mr. R. C. Schenck, of the Dayton Malleable Iron Co., was present at the convention, but had no exhibit, which was probably all right, as the product of his company is pretty well known and enjoys an excellent reputation.

Mr. J. S. Malloy of the Chicago Grain Door Co. has an exhibit of the Chicago grain door, and also of the Security lock bracket for car doors.

The Ohio Injector Co. makes no exhibit, but Mr. Frank W. Furry is at the convention, and as usual is reminding locomotive men of the fact that the Ohio injector is in use on a large number of locomotives and making a great reputation for itself.

One of the largest exhibits at the convention and one which attracts a great amount of attention, is made by the Chicago Pneumatic Tool Co., which shows its long list of tools in actual operation. Mr. John Duntly and Mr. Boyer have a large corps of assistants who are showing the operation of hammers, sand papering machines, air drills, belt shifters, air hoists, cushion cleaners, etc. There is a large crowd of people constantly about this exhibit.

The National Malleable Castings Co. as usual makes a good exhibit and has a large number of representatives. The Tower coupler is conspicuous among the exhibits, and in addition to it there is a large assortment of malleable iron fittings for freight cars, such as car door fastenings, center plates, oil boxes, etc.

INDUSTRIAL NOTES.

Cars and Locomotives.

—The Cleveland, Lorain & Wheeling has placed an order with the Peninsular Car Works of Detroit for 300 30-ton flat cars.

—The Barney & Smith Car Co., Dayton, O., is building three closed and 14 open cars for the Mount Clements electric road.

—The Ensign Manufactrring Co. has an order from the Chesapeake & Ohio Railway for one hundred 60,000 lbs. capacity standard hopper-bottom gondola cars.

—The Michigan-Peninsular Car Co., Detroit, Mich., has received an order from the Lehigh Valley Railroad Co. for 50 double-deck stock cars.

—The Chicago, Paducah & Memphis road, which has already placed an order for 1,000 freight cars this year, is negotiating for 500 or 1,000 more.

—The Ohio Falls Car Manufacturing Co., New Albany, Ind., has received an order from the Baltimore & Ohio Southwestern Railroad Co. to repair 600 freight cars.

—The Georgia & Alabama Railroad has ordered eight passenger coaches from the Ohio Falls Car Manufacturing Co.

—The order placed by the Seaboard Air Line with the Pittsburgh Locomotive Works for twelve 10-wheel engines calls for cylinders 19x24 in., driving wheels 58 in. in diameter, with Midvale steel tires 3½ in. thick. The engines will have United States metallic packing, Boyden brakes, Nathan injectors and lubricators, Richardson balance valve, French springs. The boilers will be of the wagon-top type of Luken steel for 180 lbs. pressure. The fire-boxes will also be of Luken steel.

—There has been in progress of development at the shops of the Boston & Maine Railroad for a month past what is known as a photograph car, to be used as an auxiliary of the advertising department. It is fitted with all the latest appliances known to the art of picture taking and will be in charge of Henry G. Peabody, who has attained to high rank in the field of photography. The first trip of the car was made last week when Mr. Peabody and his entire family began a tour of the Boston & Maine system for the purpose of obtaining reproductions of the most picturesque and romantic scenes through which the lines of the company run. These are to be used in advertising the road and the better to acquaint the general public with the natural beauties which abound throughout New England. The plan is not a new one to the management, but the method heretofore adopted in carrying it out has in no degree approached the elaborateness of the present arrangements.

—The Richmond Locomotive Works has just received an order from the Cleveland, Cincinnati, Chicago & St. Louis Railroad Co. to convert 60 of their locomotives from simple to compound engines as fast as they can be put through the shops. The railroad company has been making experiments for several years, and has found that the Richmond compound device insures a saving of some 400 tons of coal a year without loss of power or extra expense. This is the greatest revolution in locomotive construction that has been announced in recent years. Now that the expansion of steam in locomotives can be thus utilized, as it is in marine engines an economy is in the reach of railroad managers especially where fuel is very expensive.

Bridges.

—The city of New Haven will soon issue $75,000 worth of bridge bonds for the purpose of constructing the new Quinnipiac drawbridge.

—The Alexandria Bridge Co. of Alexandria, Ind., has received contract for the construction of an iron bridge across the river at Jackson, Ill.

—The contract for a steel bridge to be built over the tracks of the Lehigh Valley and Jersey Central Railroad, at Wilkesbarre, Pa., has been awarded to the Pennsylvania Steel Co. of Steelton, Pa.

—Bids will probably soon be asked by the county engineer for constructing the proposed bridge at Whiteside street Chattanooga, Tenn., at an estimated cost of $10,300.

—There is a movement on foot for the construction of a bridge across the Potomac river at Williamsport, Md.

—The contract for the bridge over the Androscoggin river has been awarded to the Youngstown (O.) Bridge Co. for $146,000. The bridge, which will be 643 ft. long, will be built of steel.

—The Franklin Engineering Co. has been awarded the contract at about $485,000 for constructing a bridge over the Schuylkill river at Strawberry Mansion, for the Fairmount Park Transportation Co. The bridge will be 1,192 ft. long and 90 ft. above the water.

—The bridge south of the Missouri Pacific depot in Mankato, Kan., has been condemned and a new bridge is to be built in its place.

—The City Railway Co. will build a bridge over Kent's creek in Rockford, Ill., in the near future.

—The Baltimore, Middle River & Sparrow's Point Railroad has awarded contract for the construction of a bridge, with steel draw 50 ft. long; length of bridge, 1,220 ft.

—Three new steel bridges will be constructed this summer by the Northern Pacific Railroad between Tacoma and Seattle. The three bridges will cost $85,000 and will cross the Stuck, White and Black rivers.

Iron and Steel.

—The Brown-Bonnell Iron Co., Youngstown, Ohio, manufacturers of refined iron bars, sheets, plates and spikes, is rolling on its large bar mill 6x6 x ¾ in. angles about 70 ft. long. These are said to be the longest iron angles of this size that have ever been made west of the Alleghany mountains. The plates weigh about one ton each, and will go to Chicago for bridge purposes.

—The American Malleable Iron Works, located at Latrobe, Pa., has been placed in the hands of the Union Trust Co. as receiver. The appointment was made on the application of Edward Jennings, a director and one of the principal creditors. The works had suspended operations and the receiver was asked for to take charge of the assets in the interest of the creditors and stockholders.

—The Sharon Iron Co., Limited, Sharon, Pa., manufacturers of pig iron, bar, band and hoop iron, will at once commence the erection of two 30-ton open hearth furnaces and bloom and sheet bar trains. The concern also expects to build this fall 25 additional retort coke ovens. The statement has been made that there will be a new company formed to operate the steel department, but it is stated that this is untrue, as all the additional plants will be operated by the Sharon Iron Co., Limited.

—The Cambria Iron Co., Johnstown, Pa., is making extensions to its mills, which will greatly increase its facilities for rolling I beams.

—It is reported from Sharon, Pa., that a soliciting committee composed of Senator James L. Fruit, W. L. Wallis and S. Henderson has secured $500,000, the required amount to be used for the purpose of erecting a large steel plant at Sharon, Pa. The principal subscribers are F. Buhl, P. L. Kimberly, the Foraker family, Senator James S. Fruit, John Ashton, Wallis & Carley, Stewart Henderson and C. H. Yeager. According to the plans, the new mill is to be located east of the N. Y. P. & O. railroad tracks, almost directly opposite the Sharon Iron Co.'s furnaces.

Machinery and Tools.

—The Morse Twist Drill & Machine Co., New Bedford, Mass., will probably soon enlarge their plant to meet constantly increasing their demand for tools for their home and foreign trade.

—The Paige Journal Box & Roller Bearing Co. has been incorporated in Chicago for $50,000 by Wm. E. Paige, O. O. Forsyth and J. R. Smith. The company will manufacture machinery.

—The Brown Hoisting & Conveying Machine Co., of Cleveland, has closed a contract with the Buffalo, Rochester & Pittsburgh R. R., for a complete plant of Brown's patent bridge tramways for handling iron ore, to be erected on the railway company's dock at Buffalo, and to be in operation about July 1.

—That the people of the south are hopeful of the future and believe in preparing for the better times coming is to be judged from the order just received by J. A. Fay & Co. of Cincinnati, for a complete planing mill outfit for Alexandria, La., consisting of a dimension planer, two flooring machines, an inside molder, self feeding ripping saw, cuting-off saws, exhaust fans, engine and boiler.

—The Hancock Inspirator Co. of Boston, announces that its railroad business is now to be pushed with more vigor than ever, and it has secured some good men to bring about this result. Mr. W. S. McGowan is now the general sales agent of this company, and he has secured Mr. Thos. Aldcorn and Mr. Charles E. Randall to represent its railroad department around amongst the trade. Mr. Aldcorn has long ago been favorably known as a railway master mechanic of ability, and Mr. Randall has grown up with the Hancock locomotive inspirator. This machine has been much improved and is now thoroughly up to date, and will be made in a number of sizes. Mr. McGowan was for several years with Manning, Maxwell & Moore, and has had large experience in mechanics and the handling of railway supplies.

Miscellaneous.

—The Pittsburgh Reduction Co. has put into successful operation its new rolling mill at Niagara Falls. At this mill the company is able to roll aluminum sheets 72 in. wide, and are now working on some orders for sheets 60 in. in width. Heretofore their mills near Pittsburgh had a capacity for sheets of 30 in. only.

—The Buffalo Scale Co., of Buffalo, N. Y., reports that it has recently sold a 100 ton track scale 36 ft. long to the General Electric Co., Schenectady, N. Y.; a 100 ton track scale 34 ft. long to the Buffalo & Susquehanna Railroad; a 75 ton track scale 42 ft. long to the Erie Railroad, and an 80 ton scale 42 ft. long to the United States Government, at Fort Logan, Colo. The Company is now building four track scales for a Russian railway.

—Wm. E. Hoyt, chief engineer, Buffalo, Rochester & Pittsburgh Railway, is reported as stating that the new car shops to be erected at Du Bois, Pa., will be commenced at once.

—The Ball Bearing Company of Boston will also exhibit in connection with the Hancock Co., samples of the "Hub" machinery ball bearings for all classes of machine construction. These ball bearings have attracted much attention, and have come rapidly to the front. Already there is a large demand for them, and they have repeatedly proven that they make a large saving in friction to be overcome, as well as in saving the cost of oil. Many who have heard of these bearings will be glad of an opportunity to see and investigate them at Saratoga.

—Some additional facts have been learned regarding the establishment of a locomotive works at Nijnii Novgorod, Russia, by the Russian-American Manufacturing Co. For several years the project of establishing an American locomotive plant in Russia has been under consideration by capitalists in this country. A French corporation undertook a similar enterprise, but, mainly owing to lack of sufficient capital, the plant that was established has not met with very great success. The firm of Edwin D. Smith & Co. of this city, became interested in the matter, and Mr. Smith made two protracted trips to Russia to investigate the possibilities of carrying the project to completion. He is at present in Russia for the third time. Walter F. Dixon, an experienced engineer, formerly connected with the Rogers Locomotive Works, in Paterson, N. J., also made two visits, covering a period of nearly a year, to the empire. As a result of their successful missions a company of American capitalists has been incorporated under the title of the Russian-American Manufacturing Co., which will build the works. The plant is to be built in connection with the Sormova Works, an extensive establishment in Nijnii Novgorod, manufacturing cars, steamboats, steam boilers, etc., and employing 5,000 hands. Engineer Dixon is to have entire charge of the locomotive works, which will be controlled jointly by the Russian and American companies. The locomotive plant will have a capacity of manufacturing 200 engines a year, about one-fifth of the capacity of the Baldwin Works of Philadelphia, and will employ about 1,000 hands. All the foremen and engineers will be Americans. The buildings ings for the plant are at present under construction. Contracts for machinery for the plant, amounting to about $500,000, have already been awarded to American manufacturers, the bulk of the orders going to Philadelphia firms, among them being Bement, Miles & Co., William Sellers & Co., E. Harrington, Sons & Co., Newton Machine Tool Works, Pencoyd Iron Works, Pedrick & Ayer Machine Co., and Wilbraham Bros. In all about thirty firms have received contracts. The machinery will aggregate 2,000 tons, and is all to be completed by September. It will be loaded on a special steamer and shipped directly from Philadelphia to St. Petersburg. It is understood that the Czar's government has given valuable encouragement to the enterprise. As nearly 85 per cent of the railways in the empire are operated by the government the new company will of course be obliged to look to it for the greatest share of its contracts, and these, it is understood, have already been assured.